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PROGRAMMABLE CONTROLLERS

MELSEC-F

USER'S MANUAL

FX2N-16CCL-M CC-Link SYSTEM MASTER BLOCK

CC-Link

CC-Link Ver.1.10

FX2N

FX2N-16CCL-M
Control & Communication-Link System Master Block

USER'S MANUAL

Manual number : JY992D93101
Manual revision : A
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This manual provides information for the use of the FX Series CC-Link system master block. The manual has been written to be used by trained and competent personnel. The definition of such a person or persons is as follows;

a) Any engineer who is responsible for the planning, design and construction of automatic equipment using the product associated with this manual should be of a competent nature, trained and qualified to the local and national standards required to fulfill that role. These engineers should be fully aware of all aspects of safety with regards to automated equipment.

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Note : Note: the term 'completed equipment' refers to a third party constructed device which contains or uses the product associated with this manual.

Notes on the Symbols Used in this Manual

At various times through out this manual certain symbols will be used to highlight points of information which are intended to ensure the users personal safety and protect the integrity of equipment. Whenever any of the following symbols are encountered its associated note must be read and understood. Each of the symbols used will now be listed with a brief description of its meaning.

Hardware Warnings

1) Indicates that the identified danger **WILL** cause physical and property damage.

2) Indicates that the identified danger could **POSSIBLY** cause physical and property damage.

3) Indicates a point of further interest or further explanation.

Software Warnings

4) Indicates special care must be taken when using this element of software.

5) Indicates a special point which the user of the associate software element should be aware of.

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1. Introduction

1.1 Associated Manuals

Table 1.1:

Manual name	Manual number	Description
★FX2N-16CCL-M User's Guide	JY992D93201 (packed with product)	Describes the name of each part and handling of the CC-Link master block FX2N-16CCL-M.
★FX1S/FX1N/FX2N/FX2NC Programming Manual II	JY992D88101 (sent separately)	Explains the instructions in the FX1S/FX1N/FX2N/FX2NC Series PLC.
☆FX1N Hardware Manual	JY992D89301 (packed with product)	Describes the contents related to the hardware such as specification, wiring and mounting of the FX1N Series PLC.
☆FX2N Hardware Manual	JY992D66301 (packed with product)	Describes the contents related to the hardware such as specification, wiring and mounting of the FX2N Series PLC.
☆FX2NC Hardware Manual	JY992D76401 (packed with product)	Describes the contents related to the hardware such as specification, wiring and mounting of the FX2NC Series PLC.
☆FX2N-32CCL User's Manual	JY992D71801 (packed with product)	Describes programming and handling of the CC-Link interface block FX2N-32CCL.

★: Indispensable manual
☆: Manual required depending on equipment used

1.2 General Names and Abbreviations

Unless otherwise specified, this manual uses the general names and abbreviations shown in the table below to describe the CC-Link system master block FX2N-16CCL-M.

Table 1.2:

General name/ abbreviation	Description
FX2N-16CCL-M	Abbreviation of the CC-Link system master block FX2N-16CCL-M.
Cyclic transmission	Transmission method to periodically communicate the contents of remote I/Os and remote registers.
Master station	Station which controls the data link system. One master station is required in one system.
Local station	Station equipped with CPU which can communicate with the master station and other local stations in the CC-Link system of the MELSEC-A/QnA/Q Series.
Remote I/O station	Remote station which deals with bit information only (to execute I/Os with external equipment) (such as AJ65BTB1-16D and AJ65SBTB1-16D).
Remote device station	Remote station which deals with bit information and word information (to execute I/Os with external equipment and exchange analog data) (such as FX2N-32CCL, AJ65BT-64AD, AJ65BT-64DAV and AJ65BT-64DAI).
Remote station	General name for remote I/O station and remote device station. Controlled by the master station.
Intelligent device station	Station which can execute transient transmission (such as AJ65BT-R2) in the CC-Link system of the MELSEC-A/QnA/Q Series.
Standby master station	Station for backup which takes over data link control when the master station is disconnected due to abnormality in the PLC CPU, the power supply, etc. in the CC-Link system of the MELSEC-A/QnA/Q Series.
Master block	Abbreviation for FX2N-16CCL-M.
SB	Link special relay (for CC-Link). 1-bit information which indicates the operation status and the data link status of the master/local station. Represented in "SB" for convenience.
SW	Link special register (for CC-Link). 16-bit information which indicates the operation status and the data link status of the master/local station. Represented in "SW" for convenience.
RX	Remote input (for CC-Link) 1-bit information input from a remote station to the master station. Represented in "RX" for convenience.
RY	Remote output (for CC-Link) 1-bit information output from the master station to a remote station. Represented in "RY" for convenience.
RWw	Remote register (write area for CC-Link) 16-bit information output from the master station to a remote device station. Represented in "RWw" for convenience.
RWr	Remote register (read area for CC-Link) 16-bit information input from a remote device station to the master station. Represented in "RWr" for convenience.

2. Overview

This chapter describes the overview of the CC-Link system master block FX2N-16CCL-M for the FX Series PLC.
The abbreviated term "CC-Link" stands for "Control & Communication-Link". "CC-Link" is used hereafter in this manual.

2.1 Overview of CC-Link System

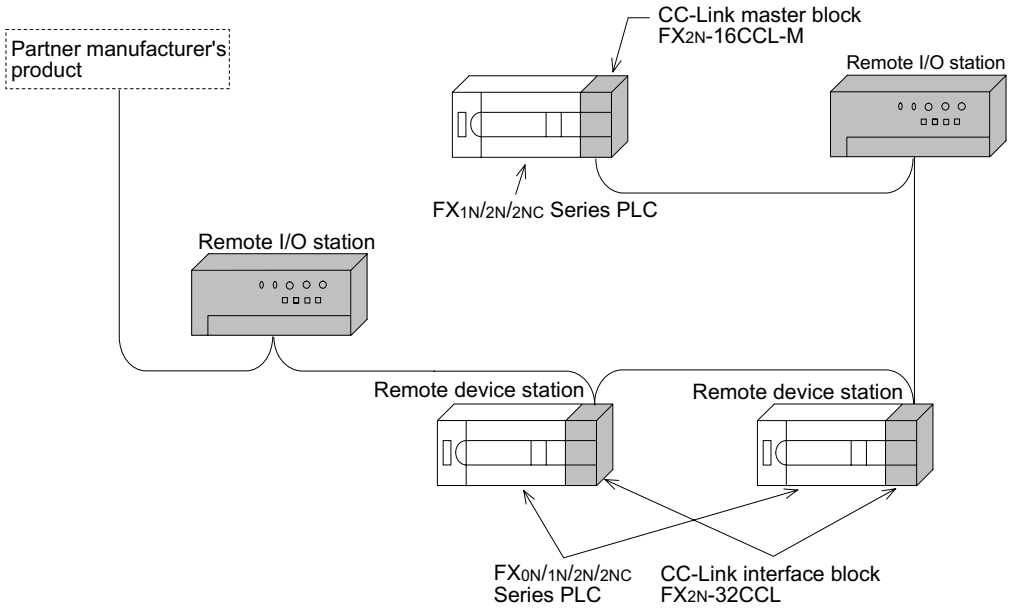
The CC-Link system connects distributed I/O modules, special function modules, etc. with dedicated cables, and controls such modules from the PLC CPU.

1) By distributing each module to the facility equipment such as conveyor lines and machines, the wiring conservation of the entire system can be accomplished.
2) Simple, high speed communication can be accomplished with modules that handle the ON/OFF data such as I/Os or the numeric data.
3) Connections can be made to different types of devices made by partner manufacturers, giving flexibility to the system.

2.2 Overview of CC-Link Master Block FX2N-16CCL-M

The CC-Link master block FX2N-16CCL-M is a special extension block which assigns an FX Series PLC as the master station of the CC-Link system.

1) Remote I/O stations and remote device stations can be connected to the master station (FX Series PLC).
2) By using the CC-Link interface block FX2N-32CCL, two or more FX Series PLCs can be connected as remote device stations to configure a simple distributed system.



Master station : Station which controls the data link system

Remote I/O station : Remote station which handles only the 1-bit information

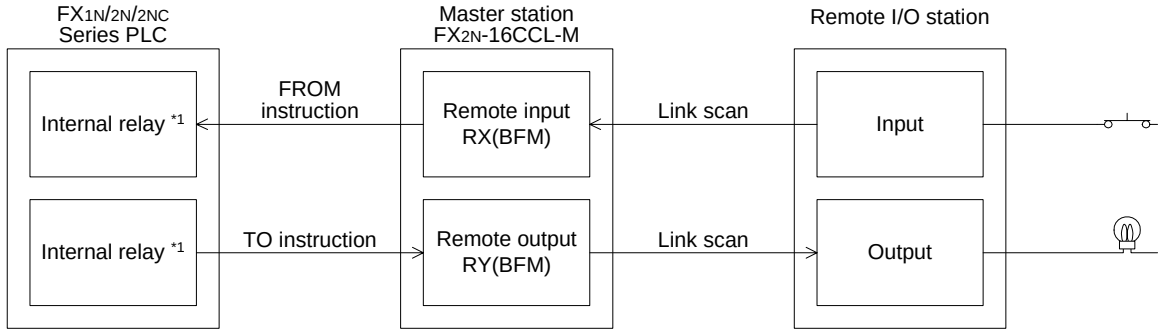
Remote device station: Remote station which handles both bit information and word information

2.3 Characteristics

This section describes the characteristics of the CC-Link.

1) Communication with remote I/O station

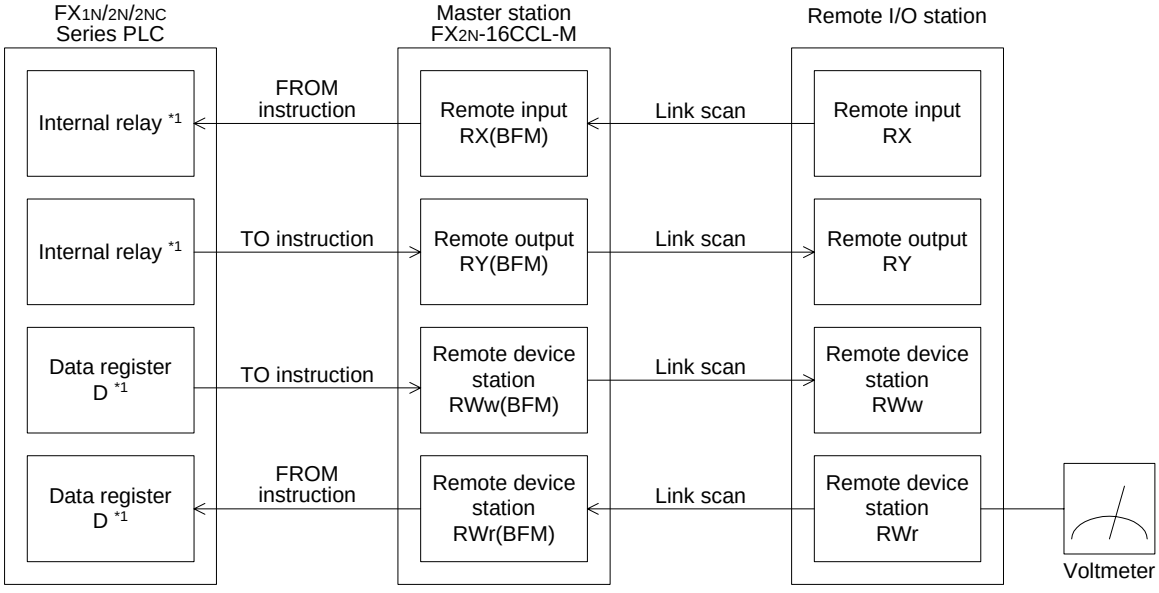
The switch ON/OFF status and the lamp ON/OFF status are communicated using remote inputs (RX) and remote outputs (RY).
Remote inputs (RX) and remote outputs (RY) are assigned to the buffer memory (BFM) numbers built in the FX2N-16CCL-M. (Refer to Sections 4.4.6 and 4.4.7.)



*1 Devices which can be specified as FROM instruction transfer destinations or TO instruction transfer sources can be used.

2) Communication with remote device station

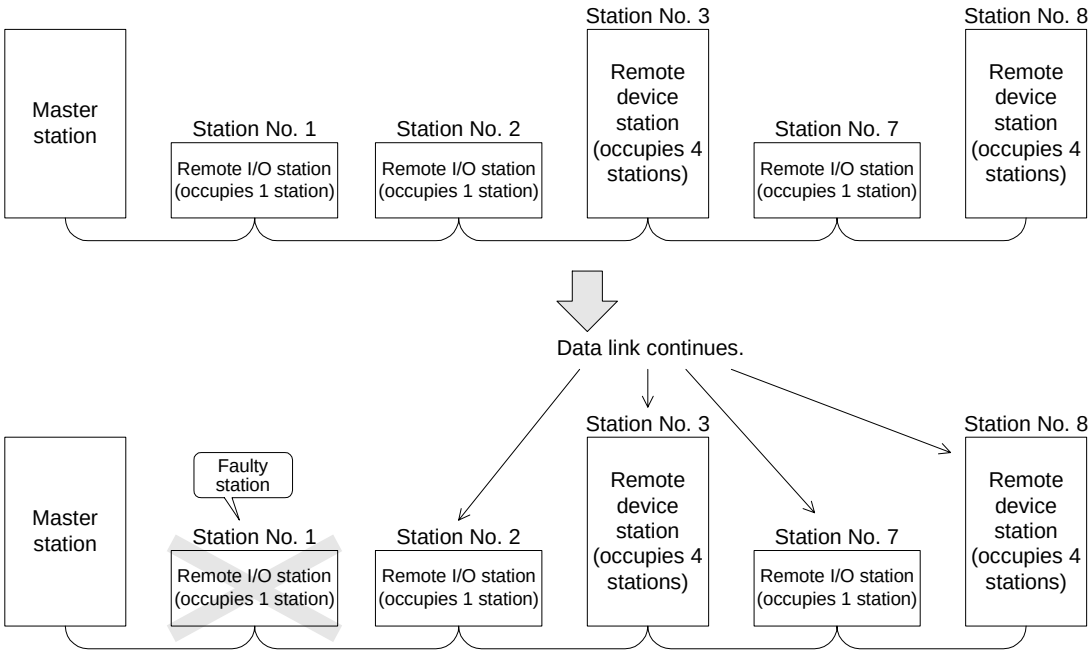
Handshake signals (such as initial requests and error occurrence flags) are communicated with remote device stations using remote inputs (RX) and remote outputs (RY).
The setting data and other data are communicated with remote device stations using remote registers (RWw and RWr).
Remote inputs (RX), remote outputs (RY) and remote registers (RWw and RWr) are assigned to the buffer memory (BFM) numbers built in the FX2N-16CCL-M. (Refer to Sections 4.4.8 and 4.4.9.)



*1 Devices which can be specified as FROM instruction transfer destinations or TO instruction transfer sources can be used.

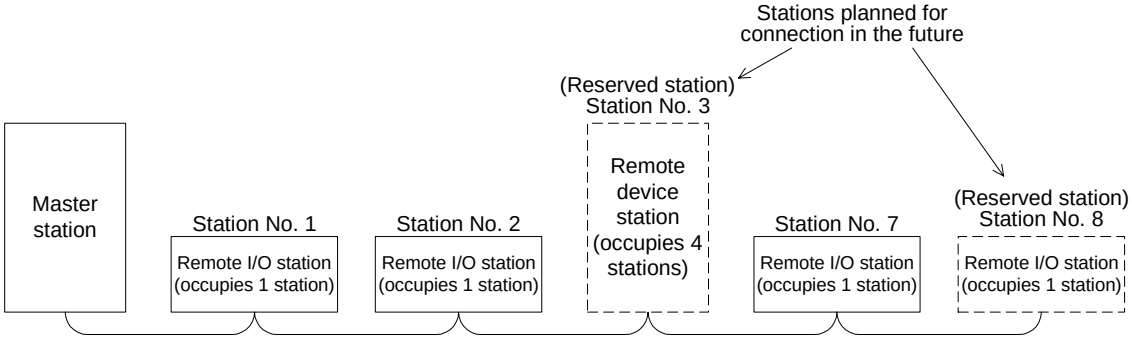
3) System down prevention (slave station cutoff function)

Because the system employs the bus method, even if there is a remote station which goes down due to power OFF, etc., it will not affect the communication with other functioning stations.
Also, in the case of a module equipped with a 2-piece terminal block, the module can be replaced during data link. (Turn off the power of a module to be replaced, then replace it.)
However, if a cable is broken, data link is disabled in all stations. (Refer to Section 5.11.2.)



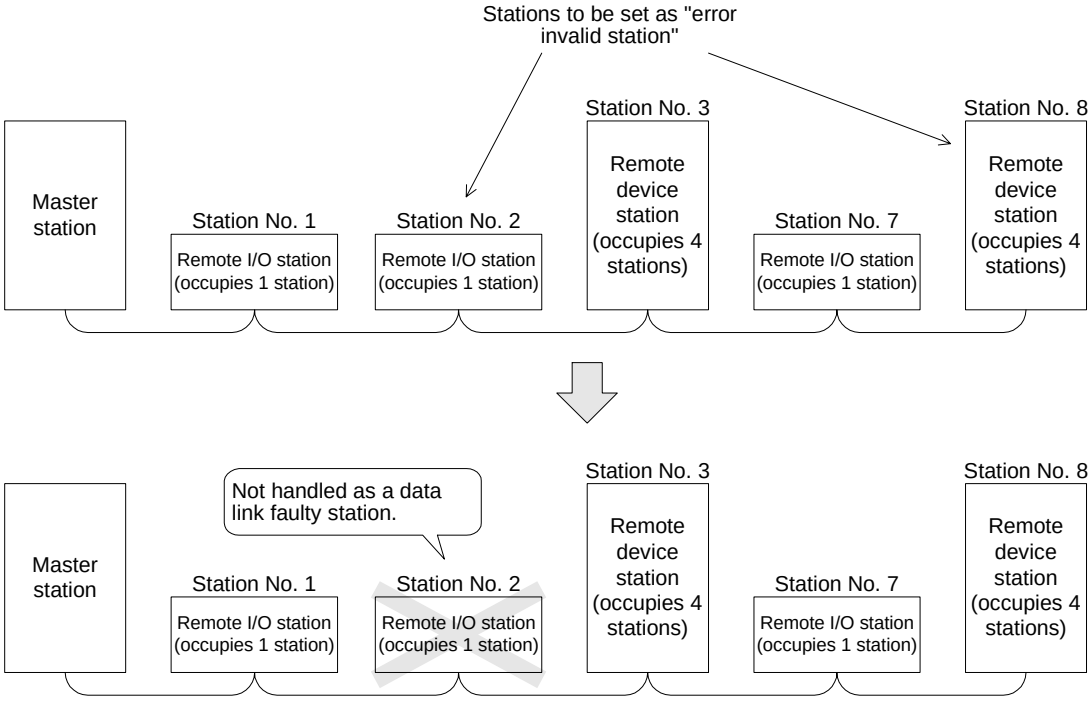
4) Reserved station function

By setting a station which is not actually connected now (which is planned for connection in the future) as a reserved station, the station will not be handled as a faulty station.



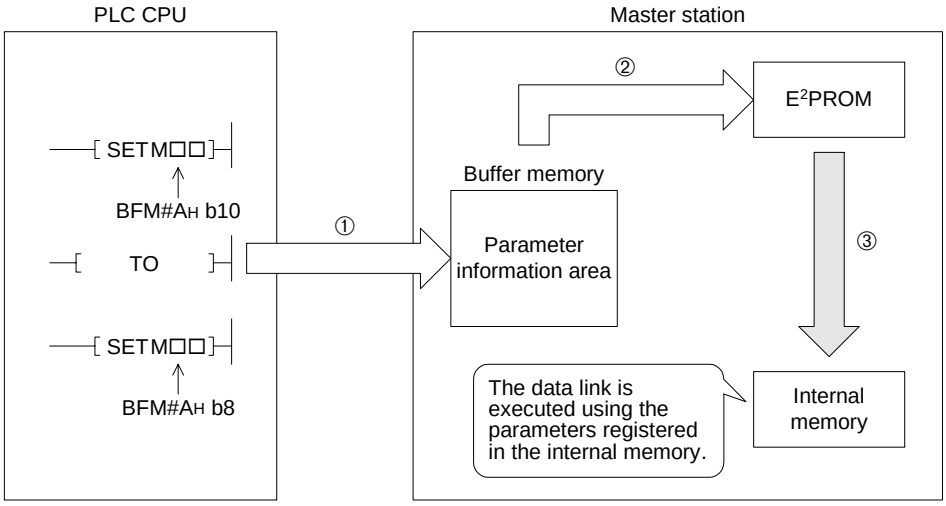
5) Error invalid station function

A station which cannot execute the data link because the power is turned off, etc. can be excluded from being handling as a "data link faulty station" in the master station.
Be careful, however, because errors will not be detected.



6) Parameter registration to the EEPROM

By registering the parameters to the EEPROM in advance, the parameter settings do not have to be executed at each startup (power OFF → ON) of the master station.
The data stored in the EEPROM remains stored even if the power of the module is turned off.



7) Data link status setting for a case where an error occurs in the CPU in the master station (PLC)

The data link status can be set (to "stop" or "continue") for a case where an "operation stop error" such as a PLC program error occurs in the master station.
When an "operation continue error" such as a battery error occurs, the data link continues without regard to the setting.

8) Status setting of the input data from a data link faulty station

The data input (received) from a data link faulty station can be cleared or kept (in the status right before an error occurs).

9) Module reset function from a sequence program

When the switch setting is changed or an error occurs in the module, the module can be reset from a sequence program without resetting the PLC.
(This excludes when the module has a module faulty input (BFM No. AH b0 is ON)).

10) RAS function

a) Automatic return function

When a station was disconnected from the link due to power OFF, etc. then returns to normal status, the station can join the data link again automatically.

b) Link status check

Using the link special relay (SB) and the link special register (SW) in the buffer memory, the current data link status can be checked.

c) Diagnosis function

Using the switch setting, the hardware and the cable wiring can be checked.

2.4 Major Differences from A/QnA/Q Series

Table 2.1:

Item	FX Series master block	A/QnA/Q Series master module
Applicable function	• Master station	• Master station • Local station • Standby master station
Number of connected modules	• Remote I/O stations: 7 max. • Remote device stations: 8 max.	• Remote I/O stations: 64 max. • Remote device stations: 42 max. • Local/standby master/intelligent device stations: 26 max.
Maximum link points per station	• Remote I/Os (RX/RY): 32 • Remote registers (RWr/RWw): 4	←
Scan cycle	• Asynchronous mode	• Asynchronous mode • Synchronous mode
Automatic refresh	Not provided	Provided
Intelligent device station	Cannot be connected.	Can be connected.

3. System Configuration

This chapter describes the system configuration for the CC-link in which an FX Series PLC functions as the master station.

3.1 Total Configuration

Up to 7 remote I/O stations and up to 8 remote device stations can be connected to one FX Series PLC functioning as the master station. (Each of the numbers "7" and "8" excludes the master station.)
However, the following conditions must be satisfied in connection:

1) Connection of remote I/O stations (up to 7 stations)

Number of I/O points in PLC (including vacant numbers and extension I/O points)		points
Number of points occupied by FX2N-16CCL-M	8	points
Total number of points occupied by other special extension PLCs		points
32 × Number of remote I/O stations		points
[Total]		≤ 256: FX2N/2NC Series PLC ≤ 128: FX1N Series PLC

2) Connection of remote device stations (up to 8 stations)

Number of remote device stations occupying 1 station	1 station × modules	stations
Number of remote device stations occupying 2 stations	2 stations × modules	stations
Number of remote device stations occupying 3 stations	3 stations × modules	stations
Number of remote device stations occupying 4 stations	4 stations × modules	stations
[Grand total]	stations	≤ 8

Up to 8 remote device stations can be connected without regard to the number of remote I/O stations shown in 1).

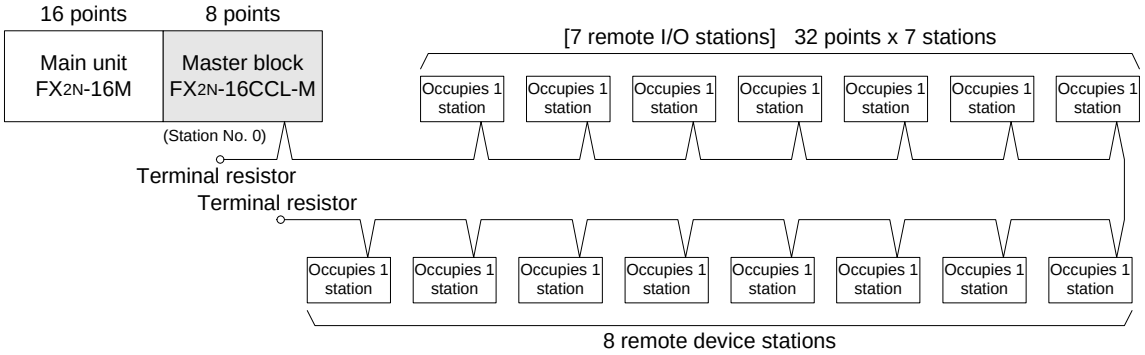
3.2 Applicable PLC

Table 3.1:

Series name	Applicable version
FX1N	All
FX2N	System version V 2.20 or later (Approximate production period: July, 2000 or later)
FX1N (FX2NC-CNV-IF is required.)	

3.3 Configuration Example

3.3.1 Example of maximum configuration



In the FX2N Series PLC, when a 16-point basic module and the master block FX2N-16CCL-M are connected, up to 7 remote I/O stations can be connected (7 is the maximum number).
As to remote device stations, up to 8 stations can be connected without regard to the number of remote I/O stations.

Number of I/O points in PLC (including vacant numbers and extension I/O points)	16	points	
Number of points occupied by FX2N-16CCL-M	8	points	
Total number of points occupied by other special extension PLCs		points	
32 × Number of remote I/O stations	224	points	
	248	points	≤ 256: FX2N/2NC Series PLC ≤ 128: FX1N Series PLC

256 - 248 = 8 points (remaining number of I/O points)

In the configuration above, up to 8 I/O points or special modules corresponding to up to 8 points can added.

3.3.2 Scan time of PLC and connection of two or more master blocks

1) Measured scan time

   - Configuration:
     [FX2N Series PLC main unit]+[FX2N-16CCL-M]+[7 remote I/O stations]+[8 remote device stations]
   - Number of link device points: 110 words
     The scan time in the configuration above is 125 ms.

2) Handling when two or more master blocks are connected

   Remote I/O stations can be connected only to the first master block.
   To the second and later master blocks, only remote device stations (up to 8 stations) can be connected.

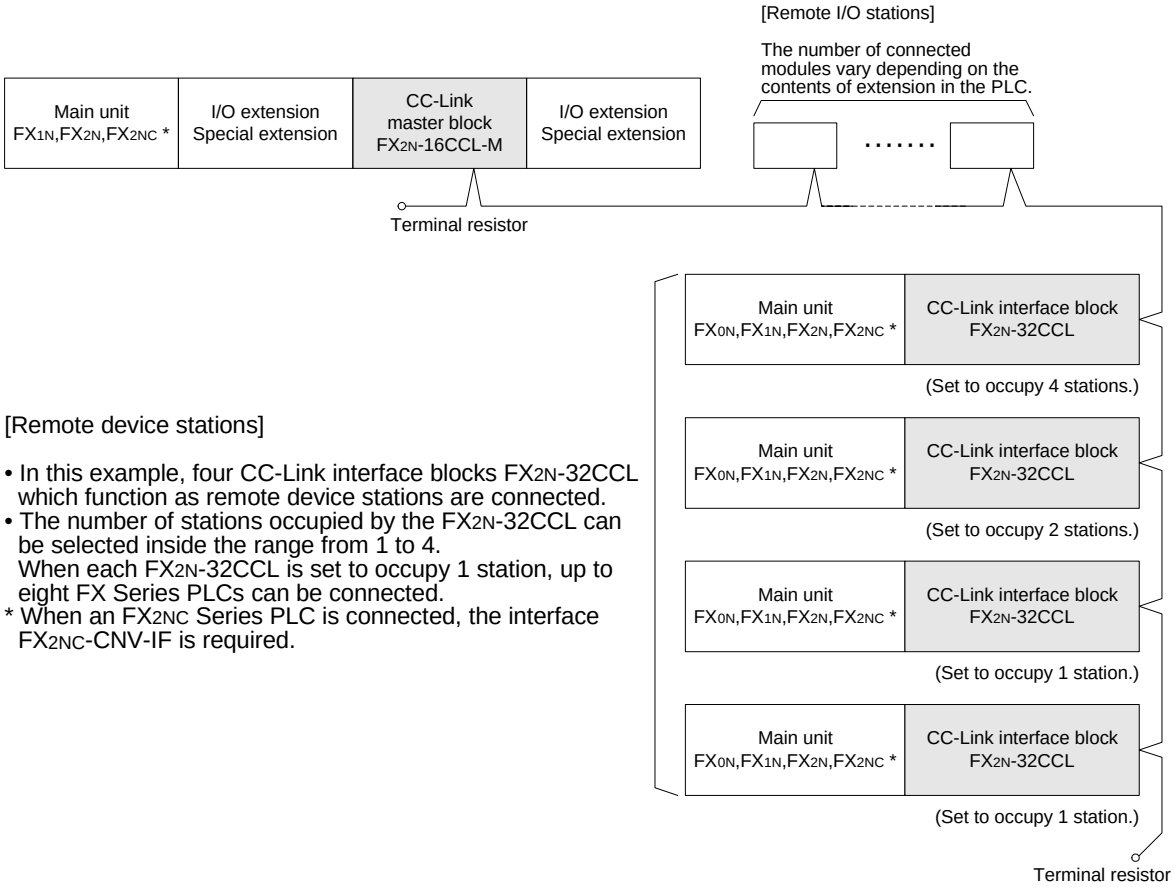
   - Configuration:
     [FX2N Series PLC main unit]
     +[FX2N-16CCL-M (first module)]+[7 remote I/O stations]+[8 remote device stations]
     +[FX2N-16CCL-M (second module)]+[8 remote device stations]
   - Number of link device points: 206 words
     The scan time in the configuration above is 233 ms.

3) Caution

   If the total scan time in the PLC exceeds 200 ms, a watchdog timer error occurs. In this case, change the value of the special data register D8000 in the PLC to prolong the watchdog timer time.

3.3.3 Example of connection of two or more FX Series PLCs

When connecting two or more FX Series PLCs in the CC-Link system, connect CC-Link interface blocks FX2N-32CCL on the child station side and use them as remote device stations.



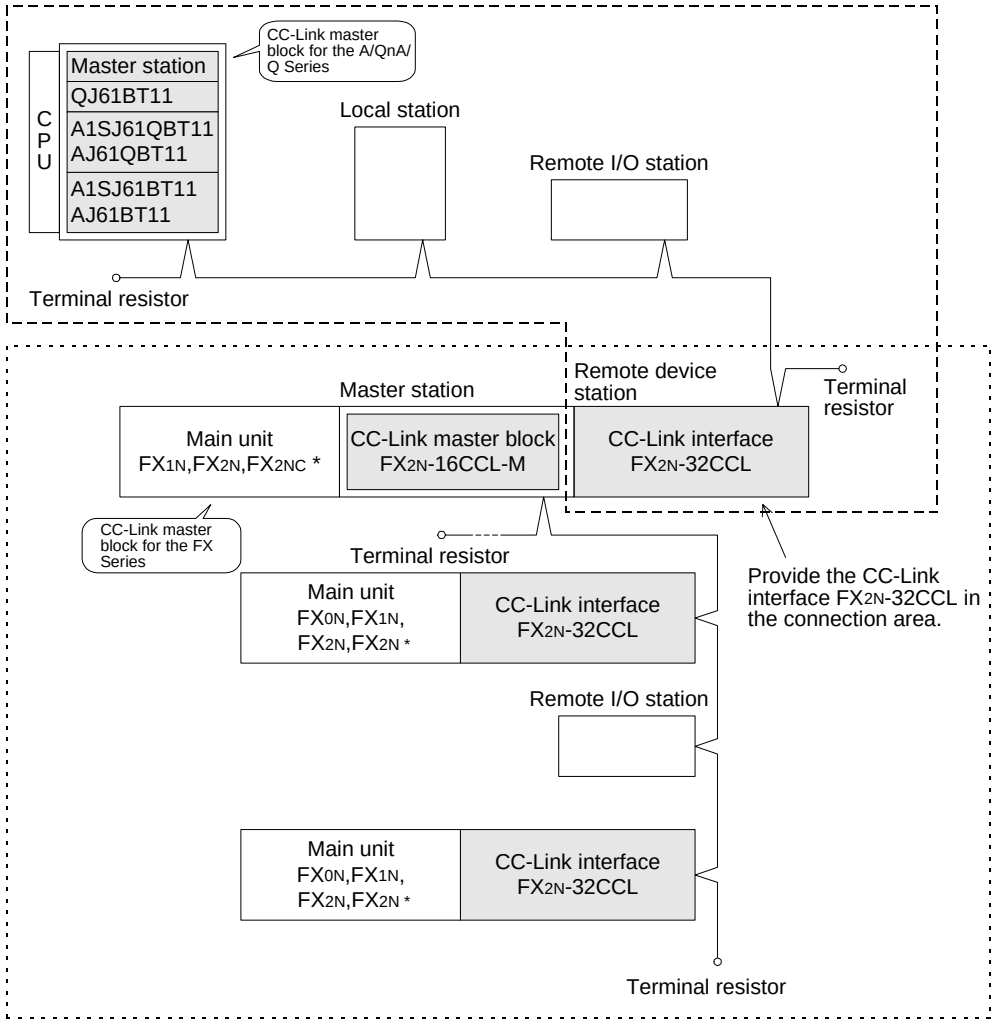
[Remote device stations]

- In this example, four CC-Link interface blocks FX2N-32CCL which function as remote device stations are connected.
- The number of stations occupied by the FX2N-32CCL can be selected inside the range from 1 to 4.
  When each FX2N-32CCL is set to occupy 1 station, up to eight FX Series PLCs can be connected.

* When an FX2NC Series PLC is connected, the interface FX2NC-CNV-IF is required.

3.3.4 Example of connection to the CC-Link system for the A/QnA/Q Series

When connecting the CC-Link system for the A/QnA/Q Series and the CC-Link system for the FX Series, provide the CC-Link interface FX2N-32CCL in the connection area as shown in the figure below.



3.4 Number of Occupied Stations and Station numbers as well as Number of Modules and Number of Stations

This section describes the relationship between the number of occupied stations and the station as well as between the number of modules and the number of stations.

1) Number of occupied stations

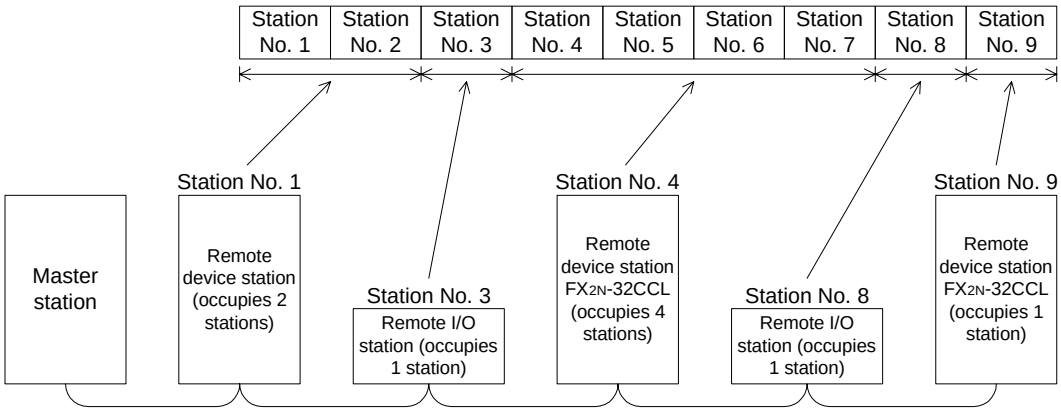
The number of stations occupied by each remote I/O station or remote device station is shown in Table 3.2.

Table 3.2:

Module		Number of occupied stations
Remote I/O station (module with 16 or 32 points)		1
Remote device station	FX2N-32CCL	1 to 4 (selectable)
	AJ65BT-64AD	2
	AJ65BT-64DAV	2
	AJ65BT-64DAI	2
	AJ65BT-D62 AJ65BT-D62D(S1)	4
	A852GOT	2 or 4

2) Station number

When the number of stations occupied by every station module is 1, assign consecutive section numbers beginning with 1 (1, 2, 3, ...).
If there is a station module occupying 2 or more stations, the number of occupied stations should be taken into account when the station are assigned.



3) Number of modules and number of stations

The number of modules indicates the number of physical modules.
The number of stations indicates the number of stations occupied by all modules as described in 1).
In the example of system configuration shown in 2), the number of modules is 5 and the number of stations is 9.

3.5 System Equipment List

The table below shows the list of equipment constructing the CC-Link for the FX Series PLC.

Table 3.3:

Product name	Model name	Description	Number of occupied stations	Station type
Master block	FX2N-16CCL-M	Master block for the FX1N/2N/2NC Series	—	Master station
FX Series PLC connection block	FX2N-32CCL	Interface block for connection of the FX0N/1N/2N/2NC Series One station occupies 32 input points and 32 output points. However, 16 points of the last station is used as the system area. One station occupies 4 RWw and 4 RWr.	1 to 4	Remote device station
Remote I/O module	AJ65BTB1-16D	1-line, 16-point DC input module (sink/source shared) 24V DC, 7 mA, 16 points/common	1	Remote I/O station
	AJ65BTB2-16D	2-line, 16-point DC input module (sink/source shared) 24V DC, 7 mA, 16 points/common		
	AJ65BTC1-32D	1-line, 32-point DC input module (sink/source shared) 24V DC, 7 mA, 32 points/common		
	AJ65BTB1-16T	1-line, 16-point transistor output module (sink) 12/24V DC, 0.5 A/point, 4 A/common, 8 points/common		
	AJ65BTB2-16T	2-line, 16-point transistor output module (sink) 12/24V DC, 0.5 A/point, 4 A/common, 8 points/common		
	AJ65BTC1-32T	1-line, 32-point transistor output module (sink) 12/24V DC, 0.1 A/point, 2 A/common, 32 points/common		
	AJ65BTB2-16R	2-line, 16-point contact output module 24V DC/240V AC, 2 A/point, 8 A/common, 8 points/common		
	AJ65BTB1-16DT	I/O module Input: 1-line, 8 DC input points (sink) 24V DC, 7 mA, 8 points/common Output: 1-line, 8 transistor output points (sink) 12/24V DC, 0.5 A/point, 8 points/common		
	AJ65BTB2-16DT	I/O module Input: 2-line, 8 DC input points (sink) 24V DC, 7 mA, 8 points/common Output: 2-line, 8 transistor output points (sink) 12/24V DC, 0.5 A/point, 4 A/common, 8 points/common		
	AJ65BTB2-16DR	I/O module Input: 2-line, 8 DC input points (sink/source shared) 24V DC, 7 mA, 8 points/common Output: 2-line, 8 contact output points 24V DC/240V AC, 2 A/point, 8 A/common, 8 points/common		

Table 3.3:

Product name	Model name	Description	Number of occupied stations	Station type
Small type remote I/O module	AJ65SBTB1-8D	1-line, 8-point DC input module (sink/source shared) 24V DC, 7 mA, 8 points/common	1	Remote I/O station
	AJ65SBTB1-16D	1-line, 16-point DC input module (sink/source shared) 24V DC, 7 mA, 16 points/common		
	AJ65SBTB1-16D1	1-line, 16-point DC input module (sink/source shared) 24V DC, 5 mA, 16 points/common, high-speed response type		
	AJ65SBTB1-32D	1-line, 32-point DC input module (sink/source shared) 24V DC, 7 mA, 32 points/common		
	AJ65SBTB1-32D1	1-line, 32-point DC input module (sink/source shared) 24V DC, 5 mA, 32 points/common, high-speed response type		
	AJ65SBTC1-32D	1-line, 32-point DC input module (sink/source shared) 24V DC, 5 mA, 32 points/common		
	AJ65SBTC1-32D1	1-line, 32-point DC input module (sink/source shared) 24V DC, 5 mA, 32 points/common, high-speed response type		
	AJ65SBTC4-16D	2-, 3-, 4-line, 16-point DC input module (sink/source shared) 24V DC, 5 mA, 16 points/common		
	AJ65SBTW4-16D	Waterproof, 4-line, 16-point DC input module (sink/source shared) 24V DC, 5 mA, 16 points/common, waterproof type		
	AJ65SBTB1-8T	1-line, 8-point transistor output module (sink) 12/24V DC, 0.5 A/point, 2.4 A/common, 8 points/common		
	AJ65SBTB1-16T	1-line, 16-point transistor output module (sink) 12/24V DC, 0.5 A/point, 3.6 A/common, 16 points/common		
	AJ65SBTB1-32T	1-line, 32-point transistor output module (sink) 12/24V DC, 0.5 A/point, 4.8 A/common, 32 points/common		
	AJ65SBTC1-32T	1-line, 32-point transistor output module (sink) 12/24V DC, 0.1 A/point, 32 points/common		
	AJ65SBTC1-32DT	I/O module Input: 1-line, 16 DC input points (sink) 24V DC, 5 mA, 32 points/common Output: 1-line, 16 transistor output points (sink) 24V DC, 0.1 A/point, 32 points/common		
	AJ65SBTC1-32DT1	I/O module, high-speed response type Input: 1-line, 16 DC input points (sink) 24V DC, 5 mA, 32 points/common Output: 1-line, 16 transistor output points (sink) 24V DC, 0.1 A/point, 32 points/common		
	AJ65SBTC4-16DT	I/O module Input: 2-, 3-, 4-line, 8 DC input points (sink) 24V DC, 5 mA, 16 points/common Output: 2-, 3-, 4-line, 8 transistor output points (sink) 24V DC, 0.5 A/point, 16 points/common		

Table 3.3:

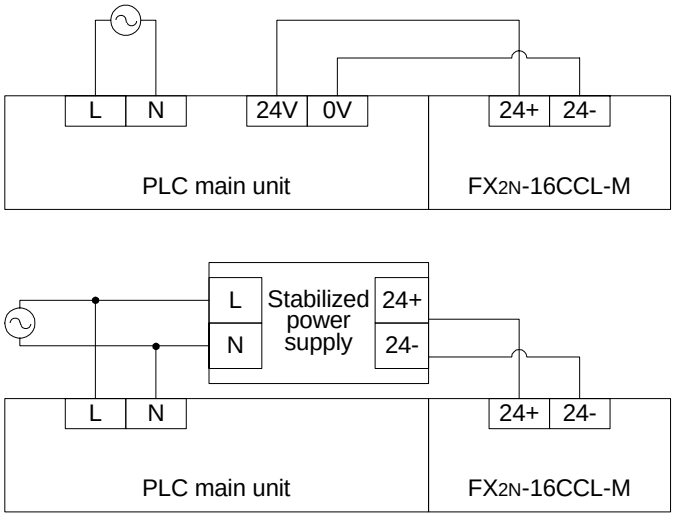
Product name	Model name	Description	Number of occupied stations	Station type
Small type remote I/O module	AJ65SBTW4-16DT	I/O module, waterproof type Input: Waterproof, 4-line, 8 DC input points (sink) 24V DC, 5 mA, 16 points/common Output: Waterproof, 4-line, 8 transistor output points (sink) 24V DC, 0.5 A/point, 16 points/common	1	Remote I/O station
Analog-digital conversion module	AJ65BT-64AD	4-channel input Analog input: -10 to +10 V, -20 to +20 mA Digital output: -2,000 to +2,000, 0 to +4,000	2	Remote device station
Digital-analog conversion module	AJ65BT-64DAV	4-channel voltage output Digital input: -2,000 to +2,000 Analog output: -10 to +10 V		
	AJ65BT-64DAI	4-channel current output Digital input: 0 to +4,000 Analog output: +4 to +20 mA		
High-speed counter module	AJ65BT-D62	24-bit binary, 5/12/24V DC input type 200 kPPS, 2 channels	4	
	AJ65BT-D62D	24-bit binary, 5/12/24V DC input type 400 kPPS, 2 channels		
	AJ65BT-D62D-S1	24-bit binary, differential input type 400 kPPS, 2 channels		
Thermocouple temperature input unit	AJ65BT-68TD	8 channels of temperature input to connect thermocouple		
Platinum resistance thermometer bulb Pt100 temperature input unit	AJ65BT-64RD3	4 channels of temperature input to connect Pt100 (3-line type)		
	AJ65BT-64RD4	4 channels of temperature input to connect Pt100 (4-line type)		
ID interface module	AJ65BT-D32ID2	Number of connectable readers/writers: 2		
Graphic operation terminal	A852GOT-LWD/LBD	Black-and-white liquid crystal type (2 colors) Resolution: 320 × 240 dots Number of touch keys: 300	2 or 4	
	A852GOT-SWD/SBD	Color STN liquid crystal type (8 colors) Resolution: 320 × 240 dots Number of touch keys: 300		
Communication module for CC-Link connection	A8GT-J61BT15	Interface module for the CC-Link system for the GOT (for remote device station)		

3.6 Precautions When Configuring the System

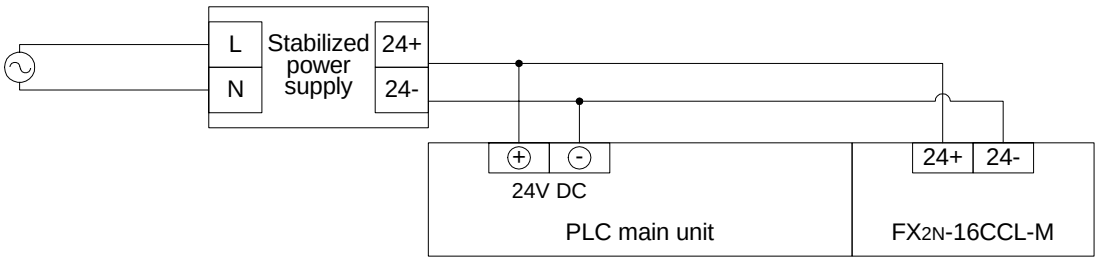
3.6.1 Wiring of power supply

When the FX2N-16CCL-M is supplied with 24V DC, the external power supply of FX2N-16CCL-M needs to be supplied at same time as the PLC main unit. See examples below.

1) When the 24V DC service power supply of a PLC with an AC power supply is used, or when a stabilized power supply unit is used.



2) When a PLC of DC power supply type is used.

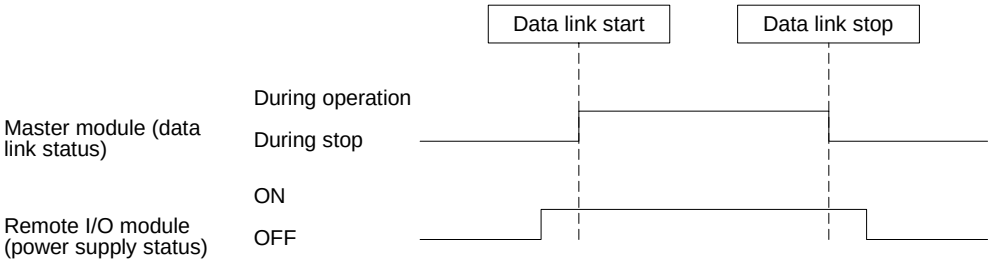


3.6.2 Wiring of remote I/O modules

Design the system with the following considerations to prevent erroneous inputs from remote I/O modules:

1) Timing of power ON and power OFF

Turn on the power of remote I/O modules first, then start the data link.
Stop the data link first, then turn off the power of remote I/O modules.

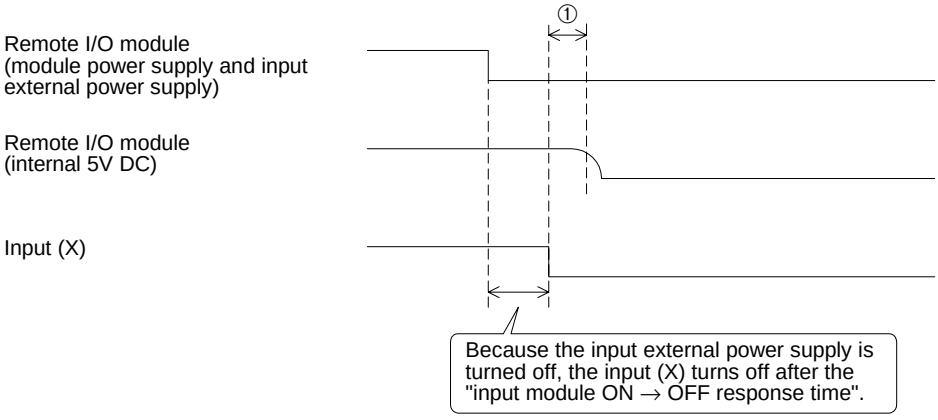


2) Momentary power failure in remote I/O modules

When momentary power failure occurs in the power (24V DC) supplied to remote I/O modules, erroneous input may occur.

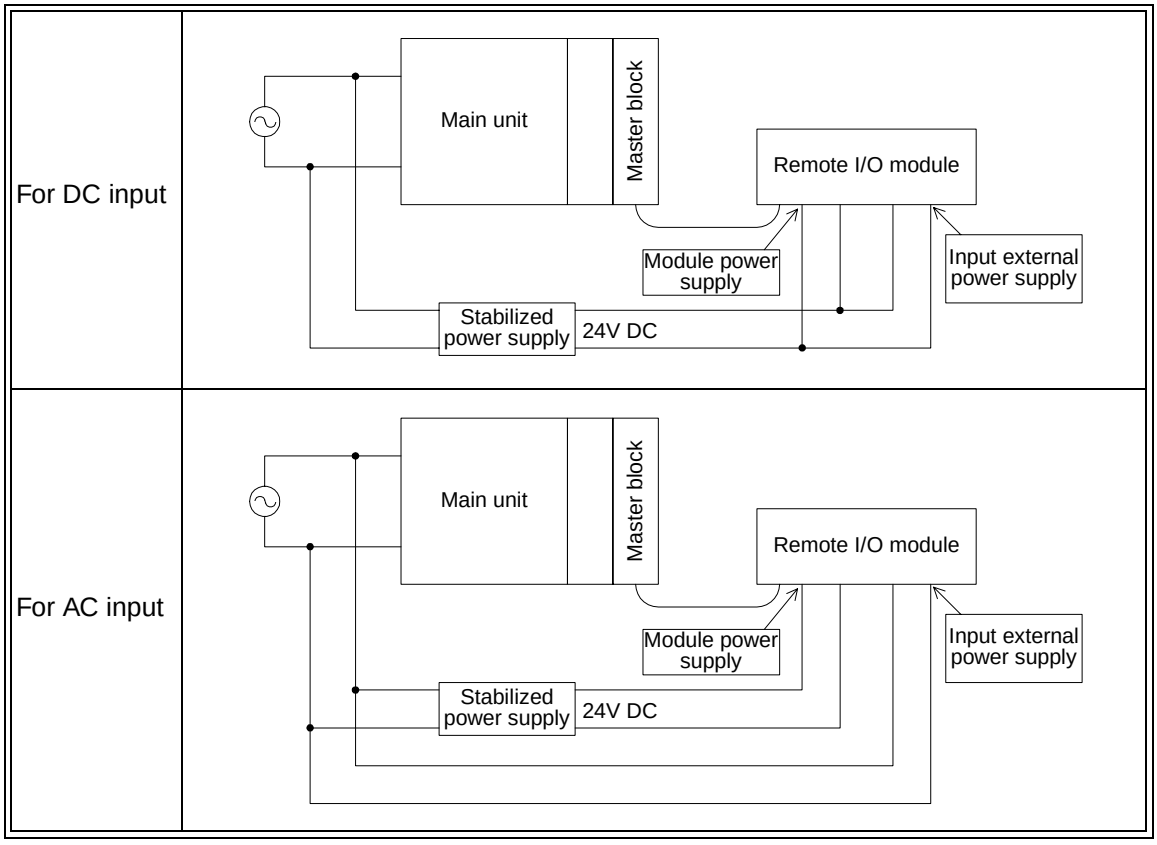
d) Cause for erroneous input due to momentary power failure

The remote I/O module hardware converts the module power (24V DC) into 5V DC inside the module, then uses the 5V DC.
When momentary power failure occurs in a remote I/O module, the following condition occurs:
(Time until 5V DC inside remote I/O module turns off)
> (Input module ON → OFF response time)
Therefore, erroneous input is caused when refresh is executed within the period of time indicated by ① in the diagram below.



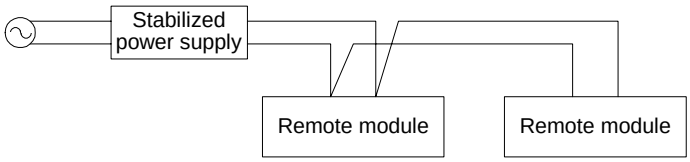
e) Countermeasures against erroneous input

Wire the module power supply, the stabilized power supply and the input external power supply from the same power source.



Remarks

When supplying power from one power source to multiple remote I/O modules, select cables and perform wiring with considerations to the voltage drop caused by the cables.
Connections can be established if the receiving port voltage of the remote I/O module is within the specification range of the remote I/O module.



4. Specification

DESIGN PRECAUTIONS

- Refer to Chapter 13 in this manual for the status of each station when a communication error occurred in the data link.
- When executing control (data changes) to an operating PLC, construct an interlock circuit in the sequence program so that the entire system always works conservatively.
  In addition, when executing control such as program changes and operation status changes (status control) to an operating PLC, thoroughly read the manual and sufficiently confirm safety in advance.
  Especially in control from external equipment to a PLC in a remote place, problems in the PLC may not be able to be handled promptly due to abnormality in data transfer.
  Construct an interlock circuit in the sequence program. At the same time, determine the actions in the system between the external equipment and the PLC CPU for protection against abnormalities in data transfer.

4.1 General Specification

Dielectric strength: 500 VAC for 1 minute (between the case and the PLC ground)
Other specification is equivalent to that of the PLC basic module.

4.2 Performance Specification

Table 4.1:

Item	Specification
Applicable function	Master station function (The local station and standby master station functions are not provided.)
CC-Link version	Ver.1.10
Transmission speed	Selectable (by rotary switch) among 156 kbps, 625 kbps, 2.5 Mbps, 5 Mbps and 10 Mbps
Station number	0 (set by rotary switch)
Maximum total cable length (maximum transmission distance)	1,200 m maximum Varies depending on the transmission speed. (Refer to Section 4.2.1.)
Maximum number of connected modules	• Remote I/O stations: 7 maximum (Each station occupies 32 I/O points of the PLC.) • Remote device stations: 8 maximum (The following condition must be satisfied.) {(1×a)+(2×b)+(3×c)+(4×d)} ≤ 8 a: Number of remote device stations occupying 1 station b: Number of remote device stations occupying 2 stations c: Number of remote device stations occupying 3 stations d: Number of remote device stations occupying 4 stations • Number of remote I/O stations + Number of remote device stations ≤ 15 "Maximum number of I/O points per system" below shall be satisfied. • For the system configuration calculation, refer to Chapter 3.
Maximum number of I/O points per system	• Connection is allowed as far as the following condition is satisfied: (Actual number of I/O points of PLC) + (Number of points occupied by special extension blocks) + (Number of points occupied by FX2N-16CCL-M: 8) + (32 x Number of remote I/O modules) ≤ 256 (FX2N/2NC Series PLC) or 128 (FX1N Series PLC) • For the system configuration calculation, refer to Chapter 3.
Number of link points per station	Remote I/O station : Remote I/O = 32/32 (RX/RY) points Remote device station: Remote I/O = 32/32 (RX/RY) points Remote register = 4 (RWw) points (master station → remote device station) Remote register = 4 (RWr) points (remote device station → master station)
Communication method	Polling method
Synchronous method	Frame synchronous method
Encoding method	NRZI method
Transmission path type	Bus (RS-485)
Transmission format	In conformance to HDLC Standard
Error control method	CRC($X^{16}+X^{12}+X^5+1$)
Connection cable	Dedicated CC-Link cable/Dedicated high-performance CC-Link cable *1
RAS function	• Automatic return function • Slave station cutoff function • Error detection by link special relay/register

Table 4.1:

Item	Specification
Number of times of parameter registration to EEPROM	Approximately 10,000 times
Connectable PLC	FX_{1N}, FX_{2N} (V 2.20 or later) and FX_{2NC} (V 2.20 or later) *2 Series PLC
Number of occupied I/O points	8 I/O points of FX Series PLC (8 points in total. The ratio between inputs and outputs is arbitrary.)
Communication with PLC	By FROM/TO instructions via the buffer memory
Note	• Scan method: Asynchronous mode • Automatic refresh: Not provided • Local station function: Not provided • Standby master station function: Not provided • Intelligent device station connection function: Not provided
Operation indication	POWER: Lit while 24V DC is supplied from outside. L RUN : Lit while communication is normal. L ERR : Lit when communication error has occurred. SD : Lit while data is being transmitted. RD : Lit while data is being received.
24V DC external power supply	Supplied from 24V DC (150 mA) external terminal block.
5V DC internal power supply	5V DC is self-supplied. 5V DC of PLC is not used.
Accessories	Terminal resistor • For standard cable: 110 Ω, 1/2 W (color cable: brown, brown and brown), 2 cables • For high performance cable: 130 Ω, 1/2 W (color cable: brown, orange and brown), 2 cables Special block number label
MASS (weight)	0.4kg (0.88lbs)

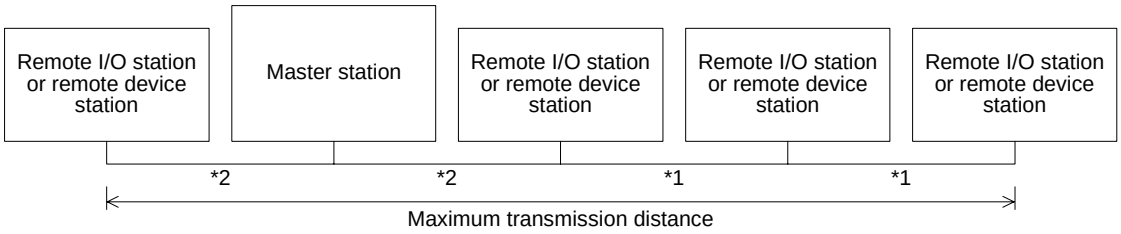
*1 Dedicated CC-Link cables and dedicated high-performance CC-Link cables cannot be used at the same time. Only either type of cables are available.
Attach a terminal resistor in accordance with the cable type. (Refer to 8.4.)

*2 When an FX_{2NC} Series PLC is connected, the interface FX_{2NC}-CNV-IF is required.

4.2.1 Maximum transmission distance

This section describes the relationship between the transmission speed and the maximum transmission distance.

1) In the system consisting of only remote I/O stations and remote device stations



*1 Cable length between remote I/O or remote device stations

*2 Cable length between the master station and an adjacent station

Dedicated CC-Link cable (requiring terminal resistor of 110 Ω)

Table 4.2:

Transmission speed	Cable length between stations		Maximum transmission distance
	*1	*2	
156kbps	30 cm or more	1 m or more	1200m
625kbps			600m
2.5Mbps			200m
5Mbps	30 cm to 59 cm *		110m
	60 cm or more		150m
10Mbps	30 cm to 59 cm *		50m
	60 cm to 99 cm *		80m
	1 m or more		100m

Dedicated high-performance CC-Link cable (requiring terminal resistor of 130 Ω)

Table 4.3:

Transmission speed	Cable length between stations		Maximum transmission distance
	*1	*2	
156kbps	30 cm or more	1 m or more	1200m
625kbps			900m
2.5Mbps			400m
5Mbps			160m
10Mbps			100m

Dedicated high-performance CC-Link cable (for the CC-Link system V 1.10) (requiring terminal resistor of 110 Ω)

When the entire system consists of only equipment and cables V 1.10, the following advantages are offered.

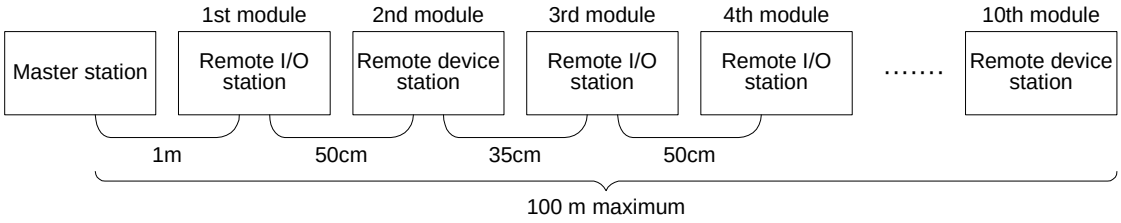
1) The cable distance between two stations is defined to 20 cm or more in any condition.
2) Because the degree of freedom in the cable length is improved, the wiring work and the system layout become easier.
3) Because excessive cable length does not have to be assured when modules are located near each other, the space efficiency is improved.
4) Cables produced by diversified manufacturers can be used at the same time.

Table 4.4:

Transmission speed	Cable length between stations *1 *2	Maximum transmission distance
156kbps	20 cm or more	1200m
625kbps		900m
2.5Mbps		400m
5Mbps		160m
10Mbps		100m

Example:

When remote I/O stations and remote device stations are connected with dedicated high-performance CC-Link cables and the transmission speed is set to 10 Mbps, the maximum transmission distance is "100 m".



4.3 Dedicated CC-Link Cable

Use dedicated CC-Link cables in the CC-Link system.
If any other cable is used, the performance of the CC-Link system cannot be guaranteed.

4.4 Buffer Memory

The buffer memory is used to swap data between the master block and the PLC.
In the PLC, the FROM/TO instructions are used to read/write data.
The contents of the buffer memory return to the default values when the power is turned off.

4.4.1 Buffer memory list

Table 4.5:

BFM number		Item	Description	Read/write possibility	Reference
Hex.	Dec.				
#0H ~ #9H	#0 ~ #9	Parameter information area	Stores the information (parameters) to execute the data link.	Read/write enabled	4.4.2
#AH ~ #BH	#10 ~ #11	I/O signal	I/O signals to control the master block	Read/write enabled	4.4.3
#CH ~ #1BH	#12 ~ #27	Parameter information area	Stores the information (parameters) to execute the data link.	Read/write enabled	4.4.2
#1CH ~ #1EH	#28 ~ #30	Master block control signal	Signals to control the master block	Read/write enabled	4.4.5
#1FH	#31	(Prohibited to use)*	—	Write disabled	—
#20H ~ #2FH	#32 ~ #47	Parameter information area	Stores the information (parameters) to execute the data link.	Read/write enabled	4.4.2
#30H ~ #DFH	#48 ~ #223	(Prohibited to use)*	—	Write disabled	—
#E0H ~ #FDH	#224 ~ #253	Remote input (RX)	Stores the input status from a remote station.	Read only	4.4.6
#100H ~ #15FH	#256 ~ #351	(Prohibited to use)*	—	Write disabled	—
#160H ~ #17DH	#352 ~ #381	Parameter information area	Stores the output status to a remote station.	Write only	4.4.7
#180H ~ #1DFH	#384 ~ #479	(Prohibited to use)*	—	Write disabled	—
#1E0H ~ #21BH	#480 ~ #538	(Prohibited to use)*	Stores the transmission data to a remote station.	Write only	4.4.8
#21FH ~ #2DFH	#543 ~ #735	(Prohibited to use)*	—	Write disabled	—
#2E0H ~ #31BH	#736 ~ #795	Remote register (RWr) (Master station: For receiving)	Stores the received data from a remote station.	Read only	4.4.9
#320H ~ #5DFH	#800 ~ #1503	(Prohibited to use)*	—	Write disabled	—
#5E0H ~ #5FFH	#1504 ~ #1535	Link special relay (SB)	Stores the data link status.	Read/write enabled (write disabled depending on device)	4.4.10
#600H ~ #7FFH	#1536 ~ #2047	Link special register (SW)	Stores the data link status.		9.3
#800H ~	#2048 ~	(Prohibited to use)*	—	Write disabled	—

* Do not write to areas that are prohibited to use. Such write may cause errors.

4.4.2 Parameter information area

Set the conditions to perform the data link.
The contents of setting can be registered to the EEPROM.

Table 4.6:

BFM number		Item	Description	Default
Hex.	Dec.			
#00H	#0	(Prohibited to use)*	—	—
#01H	#1	Number of connected modules	Set the number of connected remote station modules (including reserved stations).	8
#02H	#2	Number of retries	Set the number of retries to a faulty station.	3
#03H	#3	Number of automatic return modules	Set the number of remote station modules that can return to the system during one link scan.	1
#04H #05H	#4 #5	(Prohibited to use)*	—	—
#06H	#6	Operation specification against CPU down	Specify the data link status when an error occurs in the master station PLC.	0 (stop)
#07H ~ #09H	#7 ~ #9	(Prohibited to use)*	—	—
#CH ~ #FH	#12 ~ #15	(Prohibited to use)*	—	—
#10H	#16	Reserved station specification	Set reserved stations.	0 (No specification)
#11H ~ #13H	#17 ~ #19	(Prohibited to use)*	—	—
#14H	#20	Error invalid station specification	Specify error invalid stations.	0 (No specification)
#15H ~ #1BH	#21 ~ #27	(Prohibited to use)*	—	—
#1CH	#28	FROM/TO instruction access error judgement time	Set the FROM/TO instruction access error judgement time (unit: 10 ms).	200ms
#1DH	#29	Access outside allowable range	"1" is input when a non-connectable station or address is accessed.	0
#1EH	#30	Model code	Model code specific to the FX2N-16CCL-M	K7510
#1FH	#31	(Prohibited to use)*	—	—
#20H ~ #2EH	#32 ~ #46	Station information	Set the connected station type.	Station type: Remote I/O station Number of occupied stations: 1 Station number: 1 to 15

* Do not write to areas that are prohibited to use. Such write may cause errors.

a) Number of connected modules

Set the number of remote station modules (including reserved stations) connected to the master station.
This is not a station count.

The setting range is "1 to 15 (modules)".

Point
The station information (address 20H to 2EH) for the specified "number of connected modules" becomes valid.

b) Number of retries

Set the number of retries to a remote station with a link data error.
The setting range is "1 to 7 (times)".
If a remote station cannot recover the normal data link after executing the specified number of retries, the station is regarded as a "data link faulty station".

c) Number of automatic return modules

Set the number of remote station modules that can return to the system during one link scan.
The setting range is "1 to 10 (modules)".

d) Operation specification for CPU shut down

Specify the data link status when an "operation stop error" occurs in the master station PLC.
The setting range is "0 (stop)" and "1 (continue)".

e) Reserved station specification

Set remote stations which are included in the number of connected modules but are not actually connected now so that such stations will not be handled as "data link faulty stations"

1) When a connected remote station is set as a reserved station, the station cannot execute any data link at all.

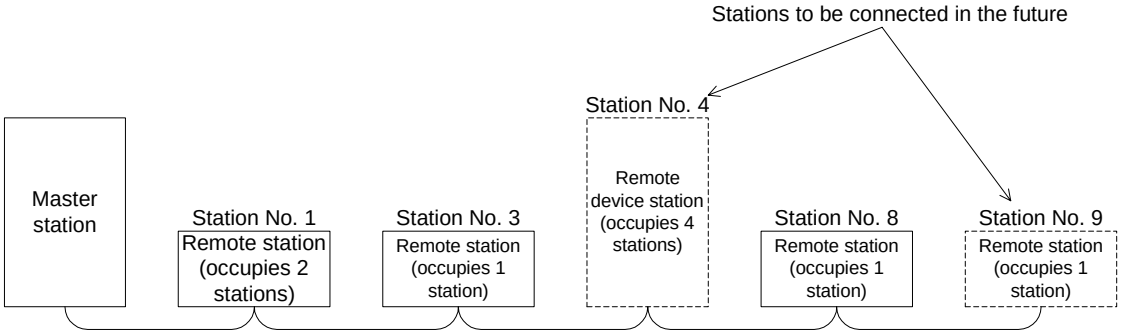
2) Set to ON the bits corresponding to the station numbers to be set as reserved.
For a remote station which occupies 2 or more stations, turn on only the bit for the station Number set by the module's station number setting switch.

Numbers 1 to 15 indicate the station numbers in the table below.

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
BFM# 10H	—	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Setting example:

When setting a remote device station with the station No. 4 and a remote station with the station No. 9 as reserved in the system configuration below.



	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
BFM# 10H	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0

f) Error invalid station specification

Specify remote stations in which data link is disabled by power OFF, etc. so that they are not handled as "data link faulty stations" by the master station. Be careful, however, for errors will not be detected.

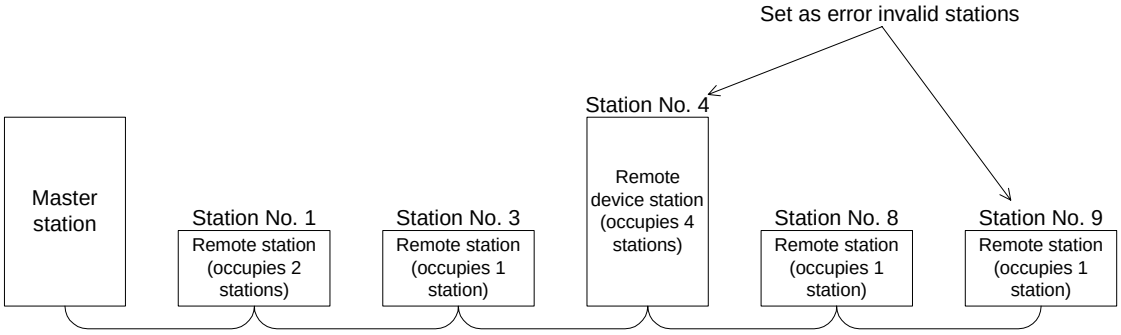
1) When the same station number is specified as a reserved station also, the reserved station specification has the priority.

2) Set to ON the bits corresponding to the station numbers to be set as error invalid stations.
   For a remote station which occupies 2 or more stations, turn on only the bit for the station number set by the module's station number setting switch.
   Numbers 1 to 15 indicate the station numbers in the table below.

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
BFM# 14H	—	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Setting example:

When setting a remote device station with the station No. 4 and a remote station with the station No. 9 as invalid in the system configuration below.

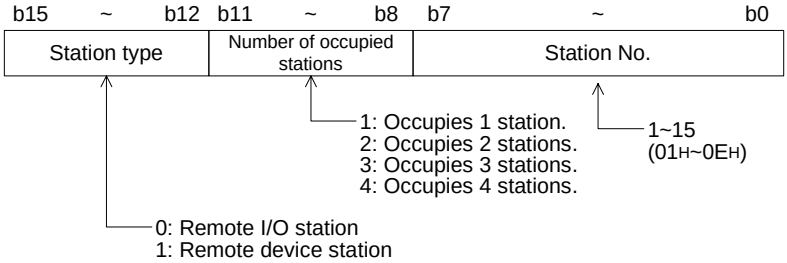


	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
BFM# 14H	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0

g) Station information

Set the station type for connected remote stations and reserved stations.

1) The figure below shows the data configuration to be set.



2) The table below shows the buffer memory address for each module.
For example, when setting for the 10th module, write the buffer memory address "BFM#29H".

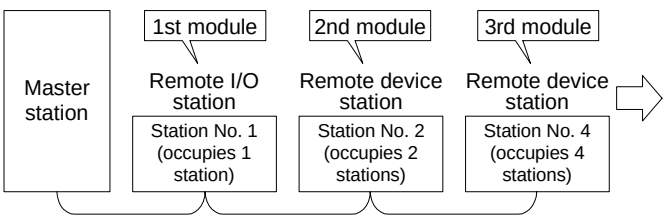
Table 4.7:

Module	BFM number	
	Hex.	Dec.
1st module	#20H	#32
2nd module	#21H	#33
3rd module	#22H	#34
4th module	#23H	#35
5th module	#24H	#36
6th module	#25H	#37
7th module	#26H	#38
8th module	#27H	#39
9th module	#28H	#40
10th module	#29H	#41
11th module	#2AH	#42
12th module	#2BH	#43
13th module	#2CH	#44
14th module	#2DH	#45
15th module	#2EH	#46

Setting example:

When connecting one remote I/O station and two remote device stations

<System configuration example>



<Station information setting>

	Station type	Number of occupied stations	Station No.
BFM#20H	0H	1H	01H
BFM#21H	1H	2H	02H
BFM#22H	1H	4H	04H

4.4.3 I/O signals to PLC

This section describes I/O signals used to control the master block.
The signals used to control the master block are assigned to the buffer memory (BFM#A_H and BFM#B_H) built in the FX_{2N}-16CCL-M.
The buffer memory of the same number works differently between the time of read (when the FROM instruction is used) and the time of write (when the TO instruction is used) as shown in the table below.
The system automatically changes over these functions in accordance with the instruction (FROM or TO).

The table below shows also the assignment of I/O numbers adopted in the A/QnA/Q Series master module as reference. These I/O numbers are available only in the A/QnA/Q Series, and are not available in the CC-Link system for the FX Series. When making a program, make sure to specify bits of the buffer memory.

Table 4.8:

PLC ← Master block Read (when FROM instruction is used)			
BFM number	**Read bit**	**Input signal name**	**Reference: Input number in A/QnA/Q Series**
BFM #A_H (#10)	b0	Module error	Xn0
	b1	Data link status in host station	Xn1
	b2	Parameter setting status	Xn2
	b3	Data link status in other stations	Xn3
	b4	Module reset acceptance completion	Xn4
	b5	(Prohibited to use)	Xn5
	b6	Normal completion of data link startup by buffer memory parameters	Xn6
	b7	Abnormal completion of data link startup by buffer memory parameters	Xn7
	b8	Normal completion of data link startup by EEPROM parameters	Xn8
	b9	Abnormal completion of data link startup by EEPROM parameters	Xn9
	b10	Normal completion of parameter registration to EEPROM	XnA
	b11	Abnormal completion of parameter registration to EEPROM	XnB
	b12	(Prohibited to use)	XnC
	b13		XnD
	b14		XnE
	b15	Module ready	XnF

Table 4.9:

PLC → Master block Write (when TO instruction is used)			
BFM number	**Write bit**	**Output signal name**	**Reference: Output number in A/QnA/Q Series**
BFM #AH (#10)	b0	Refresh command	Yn0
	b1	(Prohibited to use)	Yn1
	b2		Yn2
	b3		Yn3
	b4	Request for module reset	Yn4
	b5	(Prohibited to use)	Yn5
	b6	Request for data link startup by buffer memory parameters	Yn6
	b7	(Prohibited to use)	Yn7
	b8	Request for data link startup by EEPROM parameters	Yn8
	b9	(Prohibited to use)	Yn9
	b10	Request for parameter registration to EEPROM	YnA
	b11	(Prohibited to use)	YnB
	b12		YnC
	b13		YnD
	b14		YnE
	b15		YnF

Table 4.10:

PLC ← Master block Read (when FROM instruction is used)			
BFM number	**Read bit**	**Signal name**	**Reference: Input number in A/QnA/Q Series**
BFM #BH (#11)	b0	(Prohibited to use)	X(n+1)0
	b1		X(n+1)1
	b2		X(n+1)2
	b3		X(n+1)3
	b4		X(n+1)4
	b5		X(n+1)5
	b6		X(n+1)6
	b7		X(n+1)7
	b8		X(n+1)8
	b9		X(n+1)9
	b10		X(n+1)A
	b11		X(n+1)B
	b12		X(n+1)C
	b13		X(n+1)D
	b14		X(n+1)E
	b15		X(n+1)F

Table 4.11:

PLC → Master block Write (when TO instruction is used)			
BFM number	**Write bit**	**Signal name**	**Reference: Output number in A/QnA/Q Series**
BFM #BH (#11)	b0	(Prohibited to use)	Y(n+1)0
	b1		Y(n+1)1
	b2		Y(n+1)2
	b3		Y(n+1)3
	b4		Y(n+1)4
	b5		Y(n+1)5
	b6		Y(n+1)6
	b7		Y(n+1)7
	b8		Y(n+1)8
	b9		Y(n+1)9
	b10		Y(n+1)A
	b11		Y(n+1)B
	b12		Y(n+1)C
	b13		Y(n+1)D
	b14		Y(n+1)E
	b15		Y(n+1)F

Important
The output signals prohibited in the table above are used by the system, thus cannot be accessed by the user. If used, normal operations cannot be guaranteed.

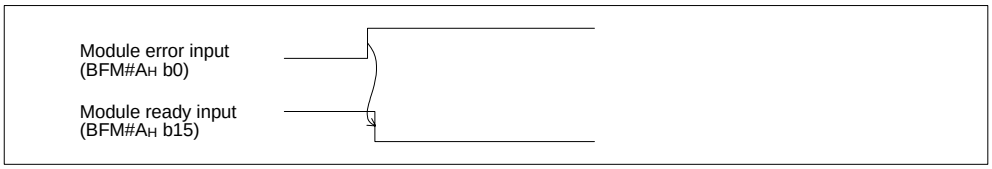
4.4.4 I/O signal details

This section describes the ON/OFF timing, the conditions, etc. of the I/O signals shown in Section 4.4.3.

[Read signals]

1) Read module error: BFM#AH b0

Indicates whether the module is normal or not.
OFF: The module is normal.
ON : The module is abnormal.



2) Read data link status in host station: BFM#AH b1

Indicates the data link status in the host station.
OFF: Data link is stopped.
ON : Data link is in progress.

3) Read parameter setting status: BFM#AH b2

Indicates the parameter setting status in the host station.
The signal SB006D has the same meaning.
OFF: The setting is normal.
ON : There is an error in the setting. (The error code is stored in SW0068.)
This signal turns OFF when the write request for data link startup by buffer memory parameters (BFM#AH b6) or the write request for data link startup by EEPROM parameters (BFM#AH b8) in which no error has occurred.

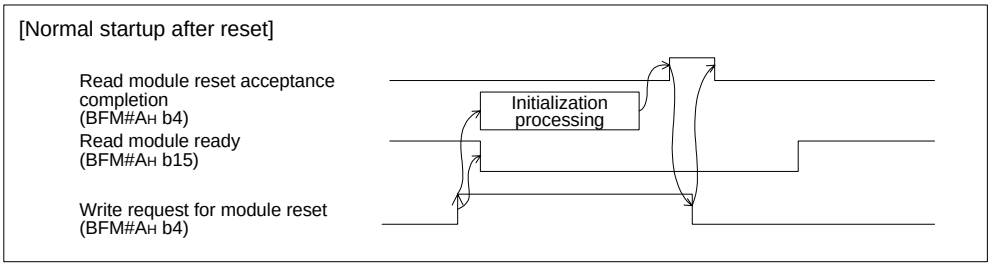
4) Read data link status in other stations: BFM#AH b3

Indicates the data link status at other stations (remote stations).
The signal SB0080 has the same meaning.
OFF: All stations are normal.
ON : There is an error in some stations. (The error station status is stored in SW0080.)

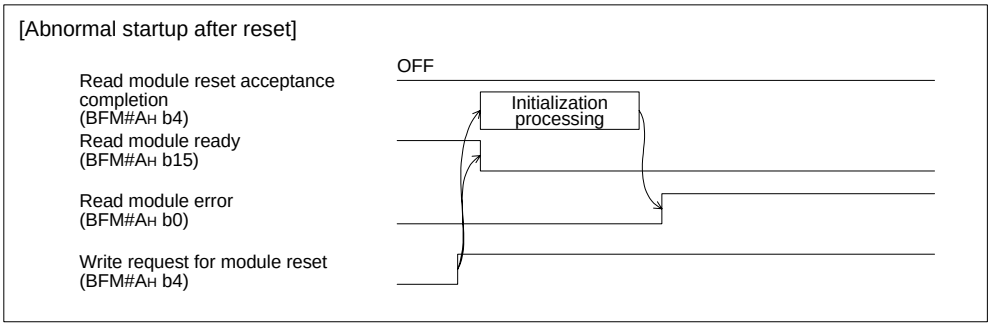
5) Read module reset acceptance completion: BFM#AH b4

Indicates the acceptance status of the request by the write request for module reset (BFM#AH b4).
This signal cannot be reset when the read module error is given (when BFM#AH b0 is ON.).

a) When the write request for module reset (BFM#AH b4) is set to ON, the read module ready (BFM#AH b15) turns OFF and the initialization processing is executed.
When the initialization processing is normally completed, the read module ready (BFM#AH b15) turns ON.
When the read module reset acceptance completion (BFM#AH b4) turns ON, the write request for module reset (BFM#AH b4) turns OFF.



b) When the write request for module reset (BFM#AH b4) is set to ON, the read module ready (BFM#AH b15) turns OFF and the initialization processing is executed.
When the initialization processing is abnormally completed, the read module ready (BFM#AH b15) does not turn ON, but the read module error (BFM#AH b0) turns ON instead.



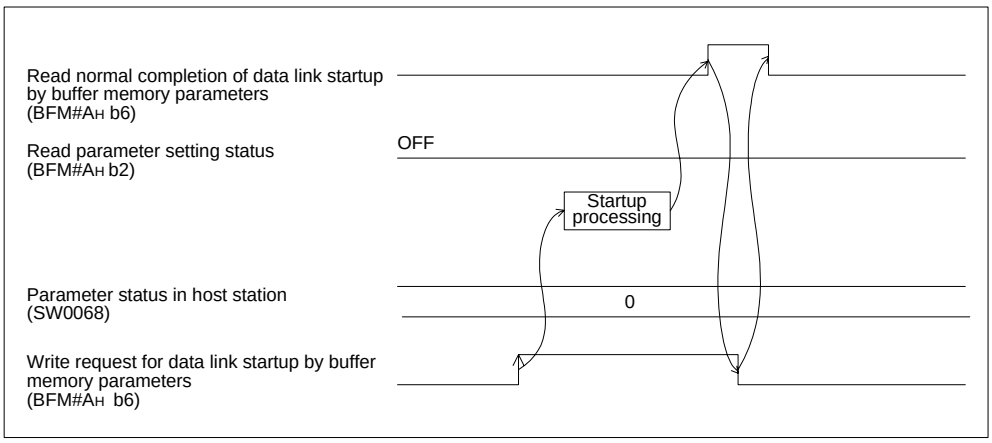
6) Read normal completion of data link startup by buffer memory parameters: BFM#AH b6

Indicates the normal completion status of the data link startup request by the write request for data link startup by buffer memory parameters (BFM#AH b6).

a) When the write request for data link startup by buffer memory parameters (BFM#AH b6) is set to ON, the contents of the buffer memory parameters are checked. When the contents are normal, the system automatically starts data link.

b) When data link startup is normally completed, the read data link startup normal completion (BFM#AH b6) turns ON.

c) When the write request for data link startup by buffer memory parameters (BFM#AH b6) is set to OFF, the read normal completion of data link startup by buffer memory parameters (BFM#AH b6) turns OFF.



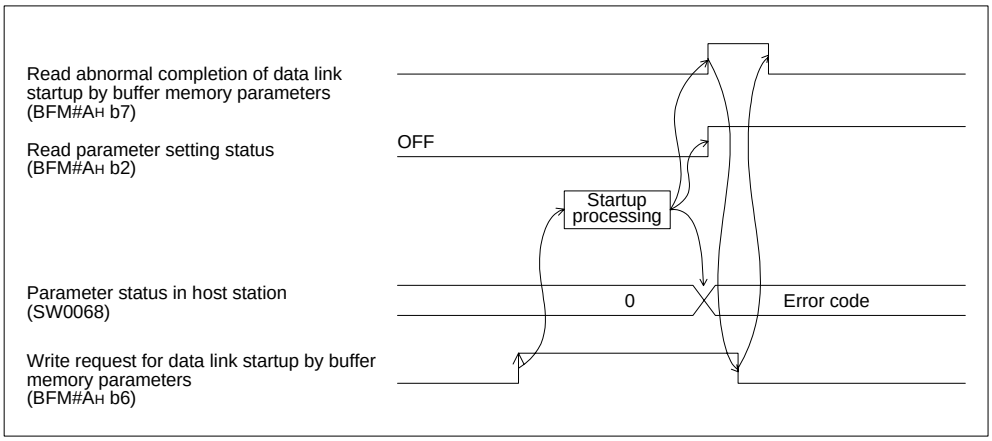
7) Read abnormal completion of data link startup by buffer memory parameters: BFM#AH b7

Indicates the abnormal completion status of the data link startup request by the write request for data link startup by buffer memory parameters (BFM#AH b6).

a) When the write request for data link startup by buffer memory parameters (BFM#AH b6) is set to ON, the contents of the buffer memory are checked. When the contents are abnormal, the read abnormal completion of data link startup by buffer memory parameters (BFM#AH b7) turns ON.

b) The read parameter setting status (BFM#AH b2) turns ON, and the error code is stored in the buffer memory for the parameter status in host station (SW0068).

c) When the write request for data link startup by buffer memory parameters (BFM#AH b6) is set to OFF, the read abnormal completion of data link startup by buffer memory parameters (BFM#AH b7) turns OFF.



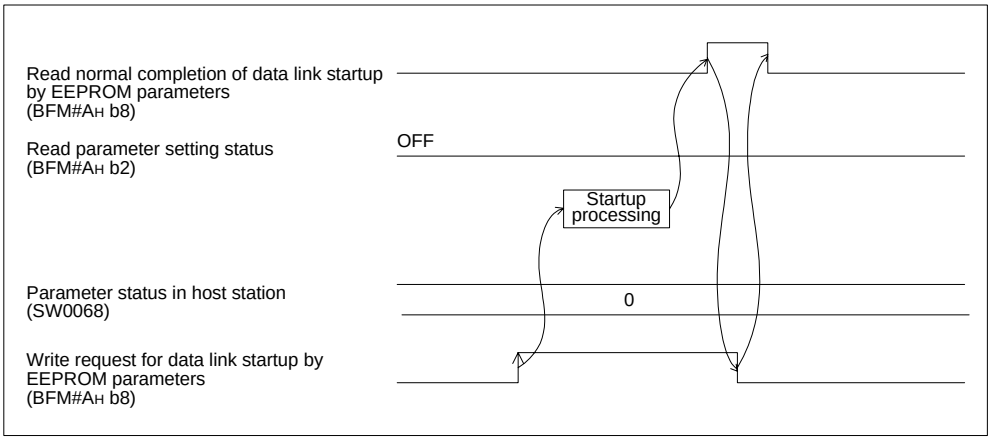
8) Read normal completion of data link startup by EEPROM parameters: BFM#AH b8

Indicates the normal completion status of the data link startup request by the write request for data link startup by EEPROM parameters (BFM#AH b8).

a) When the write request for data link startup by EEPROM parameters (BFM#AH b8) is set to ON, the contents of the EEPROM parameters are checked. When the contents are normal, the system automatically starts data link.

b) When data link startup is normally completed, the read normal completion of data link startup by EEPROM parameters (BFM#AH b8) turns ON.

c) When the write request for data link startup by EEPROM parameters (BFM#AH b8) is set to OFF, the read normal completion of data link startup by EEPROM parameters (BFM#AH b8) turns OFF.



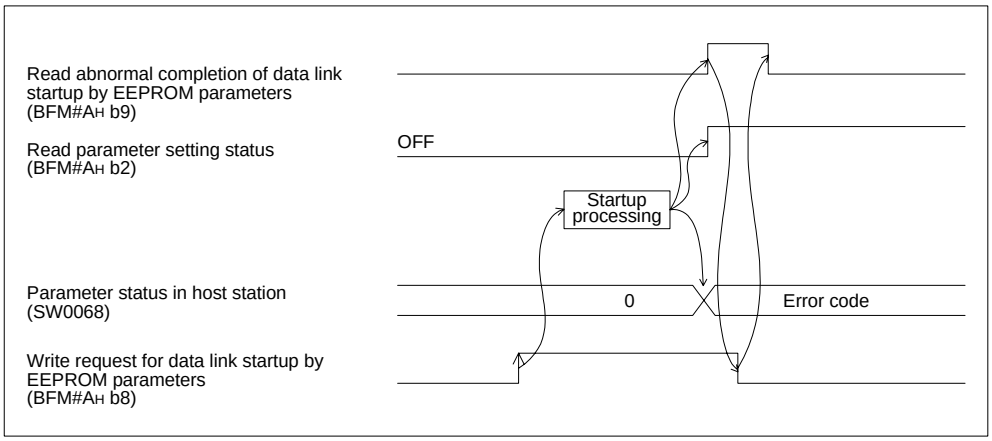
9) Read abnormal completion of data link startup by EEPROM parameters: BFM#AH b9

Indicates the abnormal completion status of the data link startup request by the write request for data link startup by EEPROM parameters (BFM#AH b8).

a) When the write request for data link startup by EEPROM parameters (BFM#AH b8) is set to ON, the contents of the EEPROM parameters are checked. When the contents are abnormal, the read abnormal completion of data link startup by EEPROM parameters (BFM#AH b9) turns ON.

b) The read parameter setting status (BFM#AH b2) turns ON, the error code is stored in the buffer memory for the parameter status in host station (SW0068).

c) When the write request for data link startup by EEPROM parameters (BFM#AH b8) is set to OFF, the read abnormal completion of data link startup by EEPROM parameters (BFM#AH b9) turns OFF.



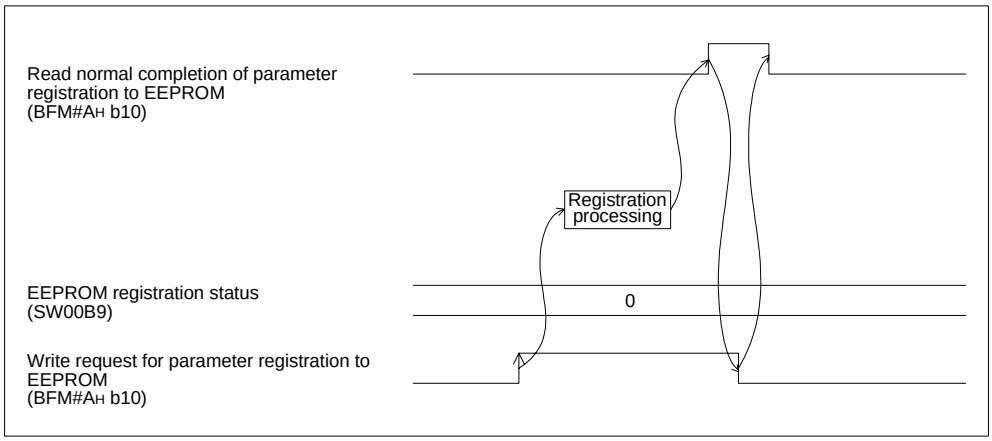
10)Read normal completion of parameter registration to EEPROM: BFM#AH b10

Indicates the normal completion status of the parameter (buffer memory address) registration to the EEPROM by the write request for parameter registration to EEPROM (BFM#AH b10).

a) When the write request for parameter registration to EEPROM (BFM#AH b10) is set to ON, the parameters stored in the buffer memory for the parameter information area are registered to the EEPROM.

b) When registration is normally completed, the read normal completion of parameter registration to EEPROM (BFM#AH b10) turns ON.

c) When the write request for parameter registration to EEPROM (BFM#AH b10) is set to OFF, the read normal completion of parameter registration to EEPROM (BFM#AH b10) turns OFF.



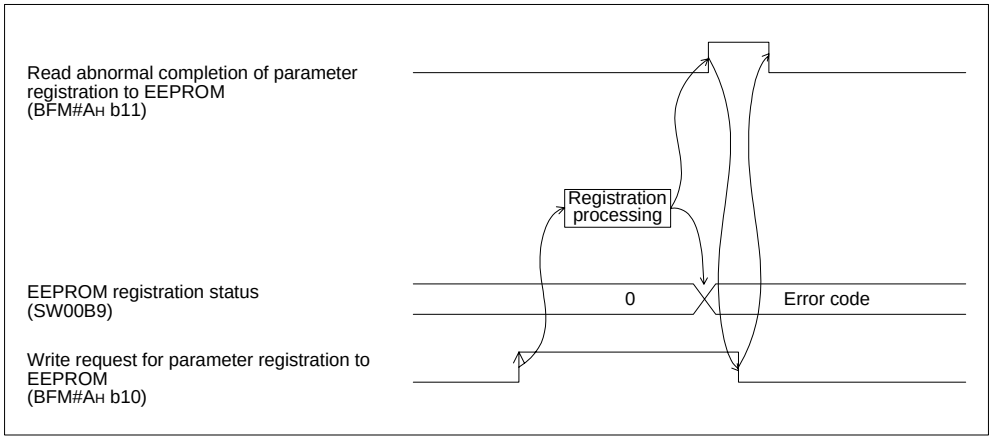
11)Read abnormal completion of parameter registration to EEPROM: BFM#AH b11

Indicates the abnormal completion status of the parameter (buffer memory address) registration to the EEPROM by the write request for parameter registration to EEPROM (BFM#AH b10).

a) When the write request for parameter registration to EEPROM (BFM#AH b10) is set to ON, the parameters stored in the buffer memory for the parameter information area are registered to the EEPROM.

b) When registration is abnormally completed, the write abnormal completion of parameter registration to EEPROM (BFM#AH b11) turns ON, and the error code is stored in the buffer memory for the EEPROM registration status (SW00B9).

c) When the write request for parameter registration to EEPROM (BFM#AH b10) is set to OFF, the read abnormal completion of parameter registration to EEPROM (BFM#AH b11) turns OFF.



12)Read module ready: BFM#AH b15

Indicates whether or not the module is ready for operation.

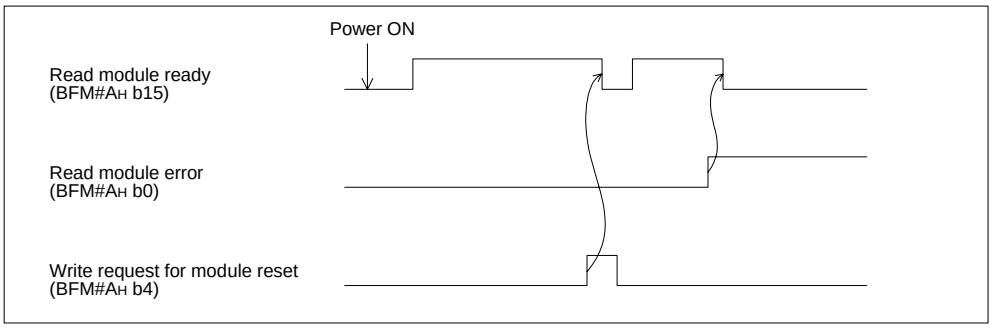
a) The signal automatically turns ON when the module becomes ready for operation.

b) The signal turns OFF when one of the following conditions occur:

1) There is an error in the module switch settings.

2) The output signal of request for module reset (BFM#AH b4) turns ON.

3) The input signal of module error (BFM#AH b0) turns ON.



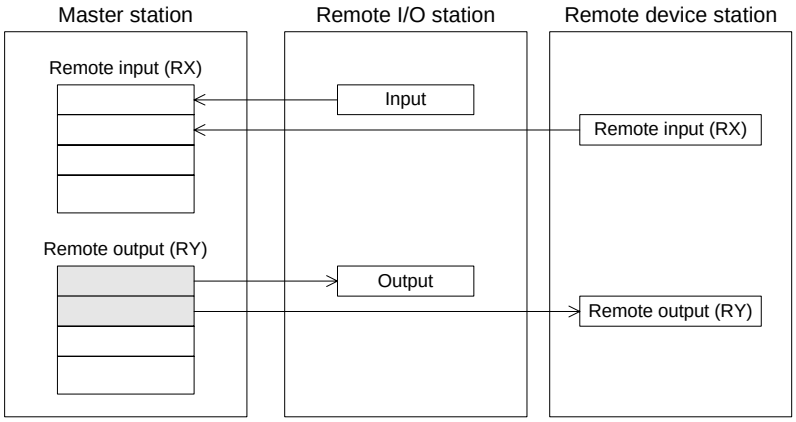
[Write signals]

13)Write refresh command: BFM#AH b0

Indicates whether or not the contents of the buffer memory for "remote output RY (addresses 160H to 17FH)" are effective.

OFF: Not effective (Sends all OFF data.)

ON : Effective (Sends the data in "remote output (addresses 160H to 17DH)" in the buffer memory.)



Points

1) Set to ON the write refresh command (BFM#AH b0) before starting up the data link.
2) When the PLC CPU is in the stop status, the write refresh command (BFM#AH b0) turns OFF.

14)Write request for module reset: BFM#AH b4

Resets the module.
The module can be reset individually without resetting the PLC.
For the signal timing, refer to 5).

15)Write request for data link startup by buffer memory parameters: BFM#AH b6

Starts up the data link in accordance with the contents of the parameters in the buffer memory.
For the signal timing, refer to 6) and 7).

16)Write request for data link startup by EEPROM parameters: BFM#AH b8

Starts up the data link in accordance with the contents of the parameters registered in the EEPROM.
For the signal timing, refer to 8) and 9).

17)Write request for parameter registration to EEPROM: BFM#AH b10

Registers the parameters stored in the buffer memory to the EEPROM.
For the signal timing, refer to 10) and 11).

4.4.5 Master block control signals

1) FROM/TO instruction access error judgement time: BFM#1C$_H$

This buffer memory sets the period of time to judge FROM/TO instruction access errors in the unit of 10 ms.
The default value is 200 ms (K20).
For example, when you would like to set the judgement time to 10 ms, write "1" using the TO instruction.
If the access time for read/write by the FROM/TO instruction from the PLC to the buffer memory (excluding the buffer memory prohibited to use) in the FX$_{2N}$-16CCL-M exceeds the period of time set here, the system regards it as an access error.

<Setting range>

1 to 32,767

<Point>

Make sure to set a value larger than one scan time to the FROM/TO instruction access error judgement time.
If the preset value is shorter than one scan time, an access time error may occur in some programs.
You can check the maximum scan time of the PLC by referring to D8012 (unit: 0.1 ms).

2) Detection of accesses outside allowable range: BFM#1D$_H$

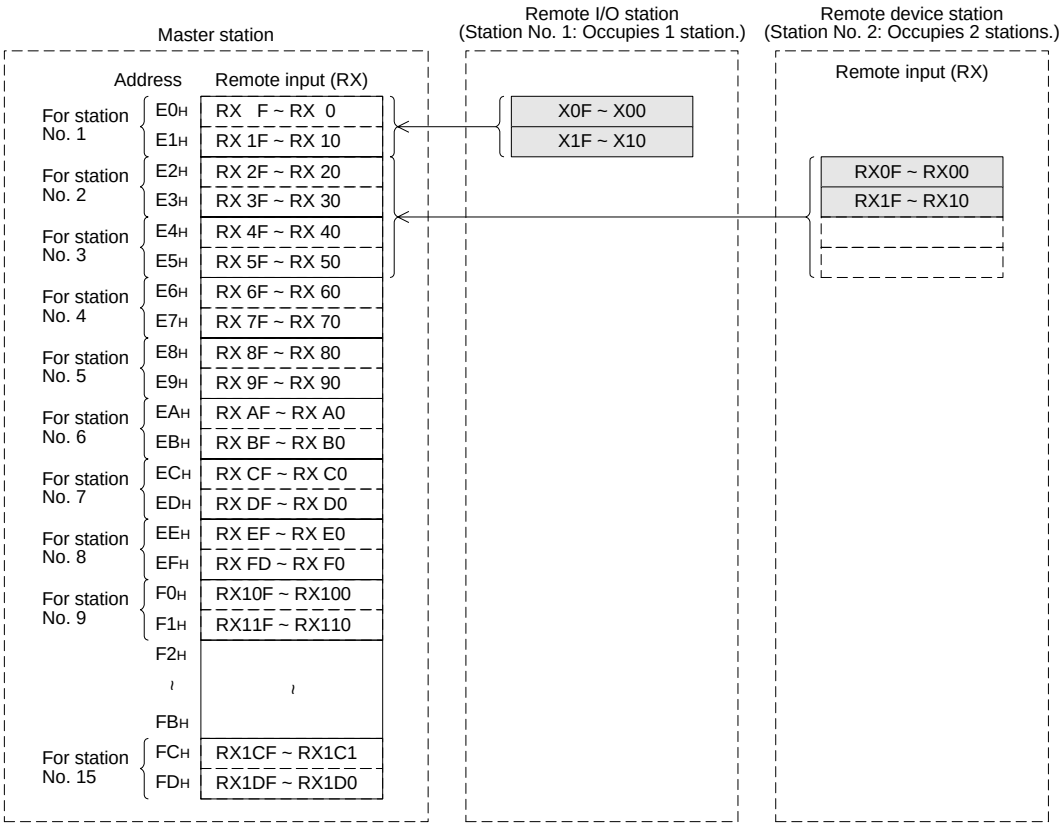
"1" is written here if there is a setting beyond the allowable specification range in the CC-Link master for the FX Series.
When I/O operations and data link are not normally executed, you can check this buffer memory to know whether or not an error has occurred.

3) Model code: BFM#1E$_H$

The model code "K7510" specific to the FX$_{2N}$-16CCL-M is written.

4.4.6 Remote input (RX)

- The input (RX) status from remote I/O stations and remote device stations is stored.
- Each station uses 2 words.

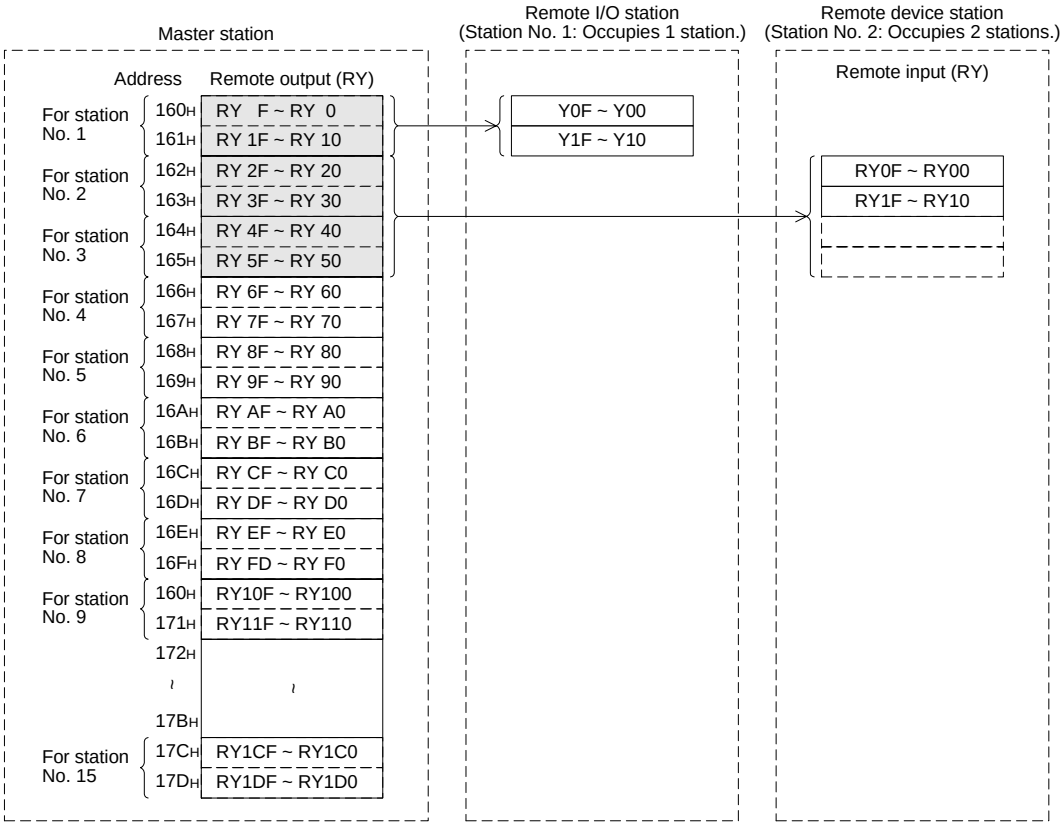


[Correspondence among buffer memory number in master station, station number and remote input (RX)]

Station number	BFM number	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
1	E0H	RX F	RX E	RX D	RX C	RX B	RX A	RX 9	RX 8	RX 7	RX 6	RX 5	RX 4	RX 3	RX 2	RX 1	RX 0
	E1H	RX 1F	RX 1E	RX 1D	RX 1C	RX 1B	RX 1A	RX 19	RX 18	RX 17	RX 16	RX 15	RX 14	RX 13	RX 12	RX 11	RX 10
2	E2H	RX 2F	RX 2E	RX 2D	RX 2C	RX 2B	RX 2A	RX 29	RX 28	RX 27	RX 26	RX 25	RX 24	RX 23	RX 22	RX 21	RX 20
	E3H	RX 3F	RX 3E	RX 3D	RX 3C	RX 3B	RX 3A	RX 39	RX 38	RX 37	RX 36	RX 35	RX 34	RX 33	RX 32	RX 31	RX 30
3	E4H	RX 4F	RX 4E	RX 4D	RX 4C	RX 4B	RX 4A	RX 49	RX 48	RX 47	RX 46	RX 45	RX 44	RX 43	RX 42	RX 41	RX 40
	E5H	RX 5F	RX 5E	RX 5D	RX 5C	RX 5B	RX 5A	RX 59	RX 58	RX 57	RX 56	RX 55	RX 54	RX 53	RX 52	RX 51	RX 50
4	E6H	RX 6F	RX 6E	RX 6D	RX 6C	RX 6B	RX 6A	RX 69	RX 68	RX 67	RX 66	RX 65	RX 64	RX 63	RX 62	RX 61	RX 60
	E7H	RX 7F	RX 7E	RX 7D	RX 7C	RX 7B	RX 7A	RX 79	RX 78	RX 77	RX 76	RX 75	RX 74	RX 73	RX 72	RX 71	RX 70
5	E8H	RX 8F	RX 8E	RX 8D	RX 8C	RX 8B	RX 8A	RX 89	RX 88	RX 87	RX 86	RX 85	RX 84	RX 83	RX 82	RX 81	RX 80
	E9H	RX 9F	RX 9E	RX 9D	RX 9C	RX 9B	RX 9A	RX 99	RX 98	RX 97	RX 96	RX 95	RX 94	RX 93	RX 92	RX 91	RX 90
6	EAH	RX AF	RX AE	RX AD	RX AC	RX AB	RX AA	RX A9	RX A8	RX A7	RX A6	RX A5	RX A4	RX A3	RX A2	RX A1	RX A0
	EBH	RX BF	RX BE	RX BD	RX BC	RX BB	RX BA	RX B9	RX B8	RX B7	RX B6	RX B5	RX B4	RX B3	RX B2	RX B1	RX B0
7	ECH	RX CF	RX CE	RX CD	RX CC	RX CB	RX CA	RX C9	RX C8	RX C7	RX C6	RX C5	RX C4	RX C3	RX C2	RX C1	RX C0
	EDH	RX DF	RX DE	RX DD	RX DC	RX DB	RX DA	RX D9	RX D8	RX D7	RX D6	RX D5	RX D4	RX D3	RX D2	RX D1	RX D0
8	EEH	RX EF	RX EE	RX ED	RX EC	RX EB	RX EA	RX E9	RX E8	RX E7	RX E6	RX E5	RX E4	RX E3	RX E2	RX E1	RX E0
	EFH	RX FF	RX FE	RX FD	RX FC	RX FB	RX FA	RX F9	RX F8	RX F7	RX F6	RX F5	RX F4	RX F3	RX F2	RX F1	RX F0
9	F0H	RX 10F	RX 10E	RX 10D	RX 10C	RX 10B	RX 10A	RX 109	RX 108	RX 107	RX 106	RX 105	RX 104	RX 103	RX 102	RX 101	RX 100
	F1H	RX 11F	RX 11E	RX 11D	RX 11C	RX 11B	RX 11A	RX 119	RX 118	RX 117	RX 116	RX 115	RX 114	RX 113	RX 112	RX 111	RX 110
10	F2H	RX 12F	RX 12E	RX 12D	RX 12C	RX 12B	RX 12A	RX 129	RX 128	RX 127	RX 126	RX 125	RX 124	RX 123	RX 122	RX 121	RX 120
	F3H	RX 13F	RX 13E	RX 13D	RX 13C	RX 13B	RX 13A	RX 139	RX 138	RX 137	RX 136	RX 135	RX 134	RX 133	RX 132	RX 131	RX 130
11	F4H	RX 14F	RX 14E	RX 14D	RX 14C	RX 14B	RX 14A	RX 149	RX 148	RX 147	RX 146	RX 145	RX 144	RX 143	RX 142	RX 141	RX 140
	F5H	RX 15F	RX 15E	RX 15D	RX 15C	RX 15B	RX 15A	RX 159	RX 158	RX 157	RX 156	RX 155	RX 154	RX 153	RX 152	RX 151	RX 150
12	F6H	RX 16F	RX 16E	RX 16D	RX 16C	RX 16B	RX 16A	RX 169	RX 168	RX 167	RX 166	RX 165	RX 164	RX 163	RX 162	RX 161	RX 160
	F7H	RX 17F	RX 17E	RX 17D	RX 17C	RX 17B	RX 17A	RX 179	RX 178	RX 177	RX 176	RX 175	RX 174	RX 173	RX 172	RX 171	RX 170
13	F8H	RX 18F	RX 18E	RX 18D	RX 18C	RX 18B	RX 18A	RX 189	RX 188	RX 187	RX 186	RX 185	RX 184	RX 183	RX 182	RX 181	RX 180
	F9H	RX 19F	RX 19E	RX 19D	RX 19C	RX 19B	RX 19A	RX 199	RX 198	RX 197	RX 196	RX 195	RX 194	RX 193	RX 192	RX 191	RX 190
14	FAH	RX 1AF	RX 1AE	RX 1AD	RX 1AC	RX 1AB	RX 1AA	RX 1A9	RX 1A8	RX 1A7	RX 1A6	RX 1A5	RX 1A4	RX 1A3	RX 1A2	RX 1A1	RX 1A0
	FBH	RX 1BF	RX 1BE	RX 1BD	RX 1BC	RX 1BB	RX 1BA	RX 1B9	RX 1B8	RX 1B7	RX 1B6	RX 1B5	RX 1B4	RX 1B3	RX 1B2	RX 1B1	RX 1B0
15	FCH	RX 1CF	RX 1CE	RX 1CD	RX 1CC	RX 1CB	RX 1CA	RX 1C9	RX 1C8	RX 1C7	RX 1C6	RX 1C5	RX 1C4	RX 1C3	RX 1C2	RX 1C1	RX 1C0
	FDH	RX 1DF	RX 1DE	RX 1DD	RX 1DC	RX 1DB	RX 1DA	RX 1D9	RX 1D8	RX 1D7	RX 1D6	RX 1D5	RX 1D4	RX 1D3	RX 1D2	RX 1D1	RX 1D0

4.4.7 Remote output (RY)

- The output (RY) status to remote I/O stations and remote device stations is stored as below.
- Each station uses 2 words.

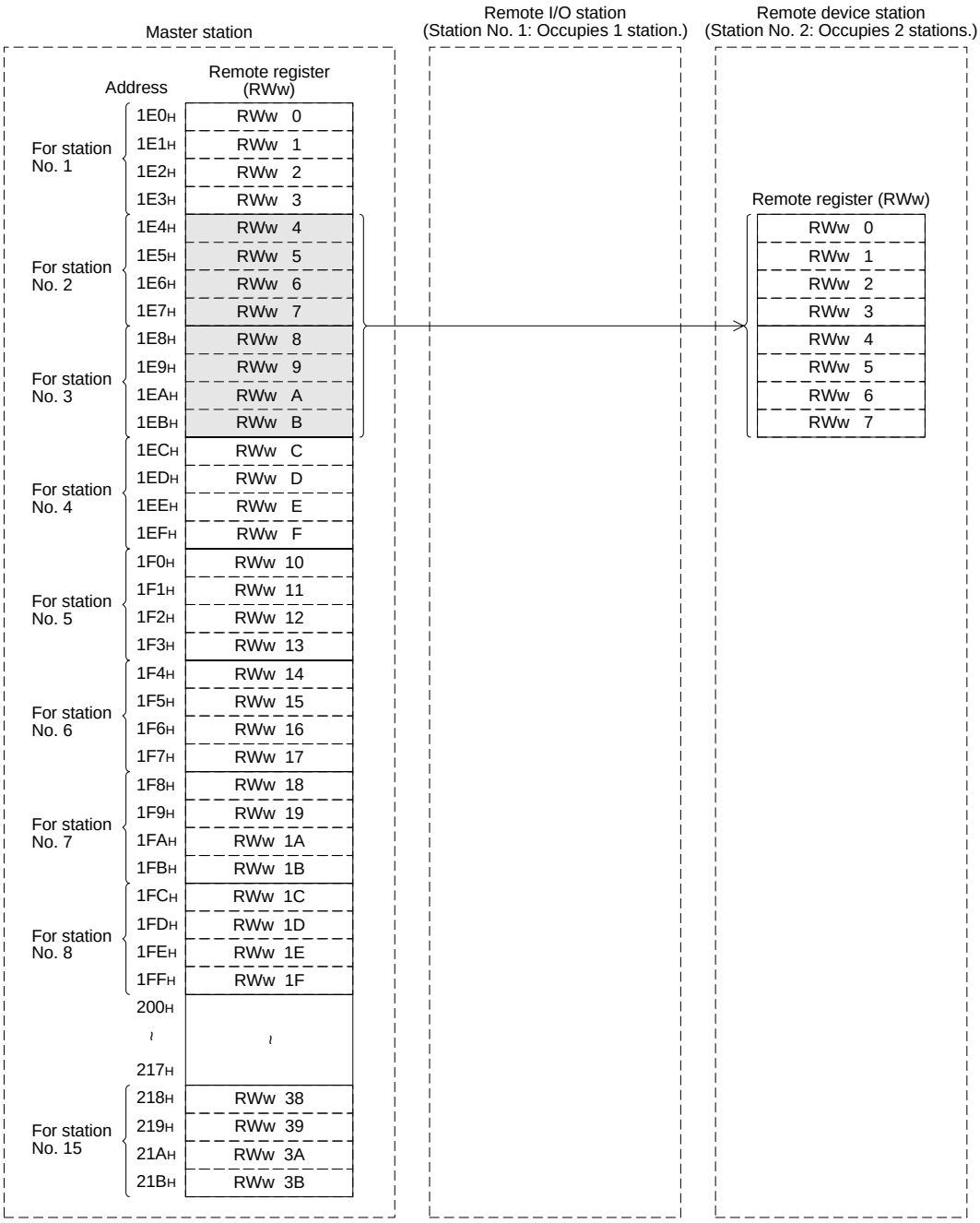


[Correspondence among buffer memory number in master station, station number and remote output (RY) number]

Station number	BFM number	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
1	160H	RY F	RY E	RY D	RY C	RY B	RY A	RY 9	RY 8	RY 7	RY 6	RY 5	RY 4	RY 3	RY 2	RY 1	RY 0
	161H	RY 1F	RY 1E	RY 1D	RY 1C	RY 1B	RY 1A	RY 19	RY 18	RY 17	RY 16	RY 15	RY 14	RY 13	RY 12	RY 11	RY 10
2	162H	RY 2F	RY 2E	RY 2D	RY 2C	RY 2B	RY 2A	RY 29	RY 28	RY 27	RY 26	RY 25	RY 24	RY 23	RY 22	RY 21	RY 20
	163H	RY 3F	RY 3E	RY 3D	RY 3C	RY 3B	RY 3A	RY 39	RY 38	RY 37	RY 36	RY 35	RY 34	RY 33	RY 32	RY 31	RY 30
3	164H	RY 4F	RY 4E	RY 4D	RY 4C	RY 4B	RY 4A	RY 49	RY 48	RY 47	RY 46	RY 45	RY 44	RY 43	RY 42	RY 41	RY 40
	165H	RY 5F	RY 5E	RY 5D	RY 5C	RY 5B	RY 5A	RY 59	RY 58	RY 57	RY 56	RY 55	RY 54	RY 53	RY 52	RY 51	RY 50
4	166H	RY 6F	RY 6E	RY 6D	RY 6C	RY 6B	RY 6A	RY 69	RY 68	RY 67	RY 66	RY 65	RY 64	RY 63	RY 62	RY 61	RY 60
	167H	RY 7F	RY 7E	RY 7D	RY 7C	RY 7B	RY 7A	RY 79	RY 78	RY 77	RY 76	RY 75	RY 74	RY 73	RY 72	RY 71	RY 70
5	168H	RY 8F	RY 8E	RY 8D	RY 8C	RY 8B	RY 8A	RY 89	RY 88	RY 87	RY 86	RY 85	RY 84	RY 83	RY 82	RY 81	RY 80
	169H	RY 9F	RY 9E	RY 9D	RY 9C	RY 9B	RY 9A	RY 99	RY 98	RY 97	RY 96	RY 95	RY 94	RY 93	RY 92	RY 91	RY 90
6	16AH	RY AF	RY AE	RY AD	RY AC	RY AB	RY AA	RY A9	RY A8	RY A7	RY A6	RY A5	RY A4	RY A3	RY A2	RY A1	RY A0
	16BH	RY BF	RY BE	RY BD	RY BC	RY BB	RY BA	RY B9	RY B8	RY B7	RY B6	RY B5	RY B4	RY B3	RY B2	RY B1	RY B0
7	16CH	RY CF	RY CE	RY CD	RY CC	RY CB	RY CA	RY C9	RY C8	RY C7	RY C6	RY C5	RY C4	RY C3	RY C2	RY C1	RY C0
	16DH	RY DF	RY DE	RY DD	RY DC	RY DB	RY DA	RY D9	RY D8	RY D7	RY D6	RY D5	RY D4	RY D3	RY D2	RY D1	RY D0
8	16EH	RY EF	RY EE	RY ED	RY EC	RY EB	RY EA	RY E9	RY E8	RY E7	RY E6	RY E5	RY E4	RY E3	RY E2	RY E1	RY E0
	16FH	RY FF	RY FE	RY FD	RY FC	RY FB	RY FA	RY F9	RY F8	RY F7	RY F6	RY F5	RY F4	RY F3	RY F2	RY F1	RY F0
9	170H	RY 10F	RY 10E	RY 10D	RY 10C	RY 10B	RY 10A	RY 109	RY 108	RY 107	RY 106	RY 105	RY 104	RY 103	RY 102	RY 101	RY 100
	171H	RY 11F	RY 11E	RY 11D	RY 11C	RY 11B	RY 11A	RY 119	RY 118	RY 117	RY 116	RY 115	RY 114	RY 113	RY 112	RY 111	RY 110
10	172H	RY 12F	RY 12E	RY 12D	RY 12C	RY 12B	RY 12A	RY 129	RY 128	RY 127	RY 126	RY 125	RY 124	RY 123	RY 122	RY 121	RY 120
	173H	RY 13F	RY 13E	RY 13D	RY 13C	RY 13B	RY 13A	RY 139	RY 138	RY 137	RY 136	RY 135	RY 134	RY 133	RY 132	RY 131	RY 130
11	174H	RY 14F	RY 14E	RY 14D	RY 14C	RY 14B	RY 14A	RY 149	RY 148	RY 147	RY 146	RY 145	RY 144	RY 143	RY 142	RY 141	RY 140
	175H	RY 15F	RY 15E	RY 15D	RY 15C	RY 15B	RY 15A	RY 159	RY 158	RY 157	RY 156	RY 155	RY 154	RY 153	RY 152	RY 151	RY 150
12	176H	RY 16F	RY 16E	RY 16D	RY 16C	RY 16B	RY 16A	RY 169	RY 168	RY 167	RY 166	RY 165	RY 164	RY 163	RY 162	RY 161	RY 160
	177H	RY 17F	RY 17E	RY 17D	RY 17C	RY 17B	RY 17A	RY 179	RY 178	RY 177	RY 176	RY 175	RY 174	RY 173	RY 172	RY 171	RY 170
13	178H	RY 18F	RY 18E	RY 18D	RY 18C	RY 18B	RY 18A	RY 189	RY 188	RY 187	RY 186	RY 185	RY 184	RY 183	RY 182	RY 181	RY 180
	179H	RY 19F	RY 19E	RY 19D	RY 19C	RY 19B	RY 19A	RY 199	RY 198	RY 197	RY 196	RY 195	RY 194	RY 193	RY 192	RY 191	RY 190
14	17AH	RY 1AF	RY 1AE	RY 1AD	RY 1AC	RY 1AB	RY 1AA	RY 1A9	RY 1A8	RY 1A7	RY 1A6	RY 1A5	RY 1A4	RY 1A3	RY 1A2	RY 1A1	RY 1A0
	17BH	RY 1BF	RY 1BE	RY 1BD	RY 1BC	RY 1BB	RY 1BA	RY 1B9	RY 1B8	RY 1B7	RY 1B6	RY 1B5	RY 1B4	RY 1B3	RY 1B2	RY 1B1	RY 1B0
15	17CH	RY 1CF	RY 1CE	RY 1CD	RY 1CC	RY 1CB	RY 1CA	RY 1C9	RY 1C8	RY 1C7	RY 1C6	RY 1C5	RY 1C4	RY 1C3	RY 1C2	RY 1C1	RY 1C0
	17DH	RY 1DF	RY 1DE	RY 1DD	RY 1DC	RY 1DB	RY 1DA	RY 1D9	RY 1D8	RY 1D7	RY 1D6	RY 1D5	RY 1D4	RY 1D3	RY 1D2	RY 1D1	RY 1D0

4.4.8 Remote register (RWw) Master station --> Remote device station

- The data transmitted to the remote register (RWw) in remote device stations is stored as below.
- Each station uses 4 words.



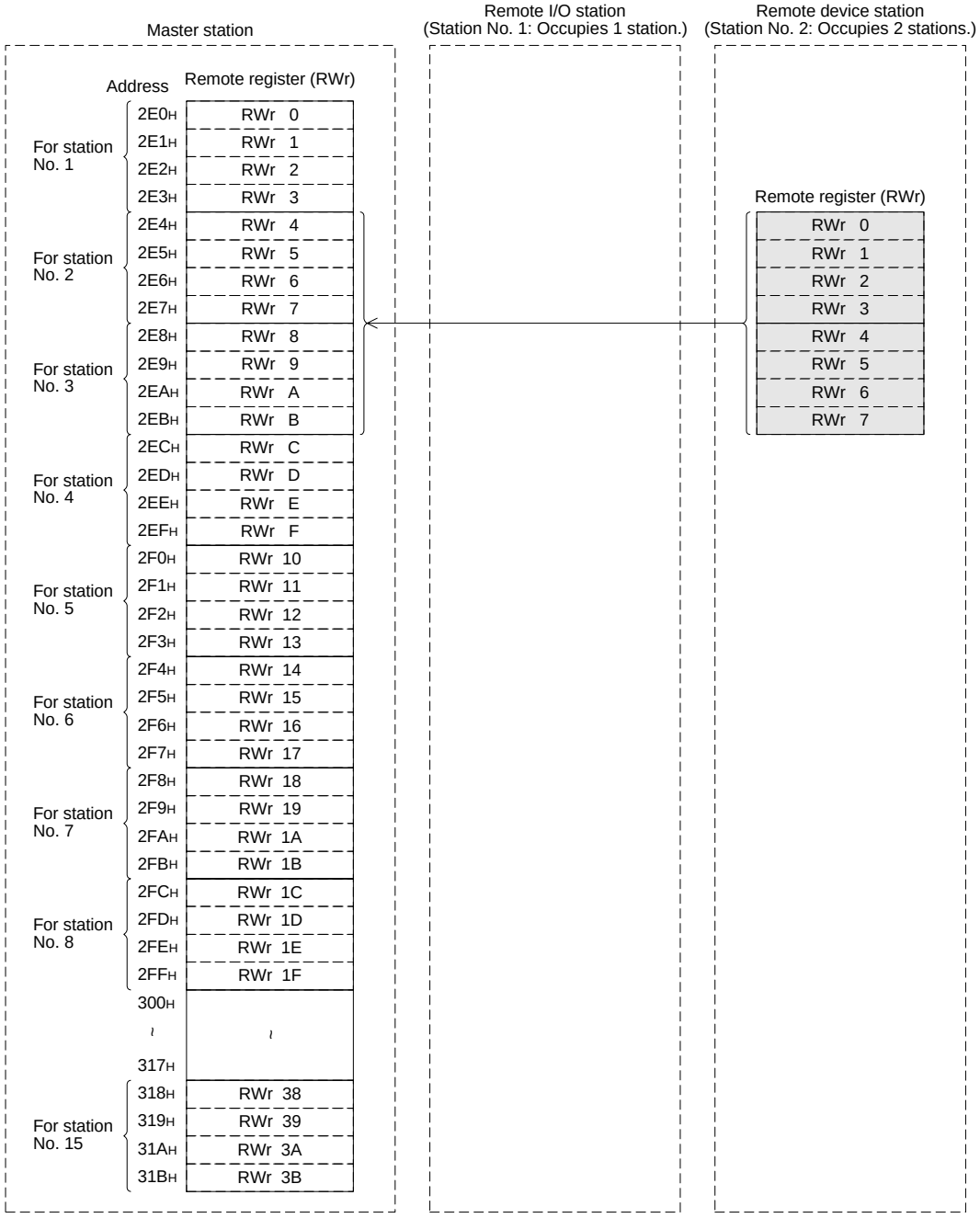
[Correspondence among buffer memory number in master station, station number and remote register (RWw) number]

Station number	BFM number	Remote register number
1	1E0H	RWw 0
	1E1H	RWw 1
	1E2H	RWw 2
	1E3H	RWw 3
2	1E4H	RWw 4
	1E5H	RWw 5
	1E6H	RWw 6
	1E7H	RWw 7
3	1E8H	RWw 8
	1E9H	RWw 9
	1EAH	RWw A
	1EBH	RWw B
4	1ECH	RWw C
	1EDH	RWw D
	1EEH	RWw E
	1EFH	RWw F
5	1F0H	RWw 10
	1F1H	RWw 11
	1F2H	RWw 12
	1F3H	RWw 13
6	1F4H	RWw 14
	1F5H	RWw 15
	1F6H	RWw 16
	1F7H	RWw 17
7	1F8H	RWw 18
	1F9H	RWw 19
	1FAH	RWw 1A
	1FBH	RWw 1B
8	1FCH	RWw 1C
	1FDH	RWw 1D
	1FEH	RWw 1E
	1FFH	RWw 1F

Station number	BFM number	Remote register number
9	200H	RWw 20
	201H	RWw 21
	202H	RWw 22
	203H	RWw 23
10	204H	RWw 24
	205H	RWw 25
	206H	RWw 26
	207H	RWw 27
11	208H	RWw 28
	209H	RWw 29
	20AH	RWw 2A
	20BH	RWw 2B
12	20CH	RWw 2C
	20DH	RWw 2D
	20EH	RWw 2E
	20FH	RWw 2F
13	210H	RWw 30
	211H	RWw 31
	212H	RWw 32
	213H	RWw 33
14	214H	RWw 34
	215H	RWw 35
	216H	RWw 36
	217H	RWw 37
15	218H	RWw 38
	219H	RWw 39
	21AH	RWw 3A
	21BH	RWw 3B

4.4.9 Remote register (RWr) Master station <-- Remote device station

- The data transmitted from the remote register (RWr) in remote device stations is stored as below.
- Each station uses 4 words.



[Correspondence among buffer memory number in master station, station number and remote register (RWr) number]

Station number	BFM number	Remote register number
1	2E0H	RWr 0
	2E1H	RWr 1
	2E2H	RWr 2
	2E3H	RWr 3
2	2E4H	RWr 4
	2E5H	RWr 5
	2E6H	RWr 6
	2E7H	RWr 7
3	2E8H	RWr 8
	2E9H	RWr 9
	2EAH	RWr A
	2EBH	RWr B
4	2ECH	RWr C
	2EDH	RWr D
	2EEH	RWr E
	2EFH	RWr F
5	2F0H	RWr 10
	2F1H	RWr 11
	2F2H	RWr 12
	2F3H	RWr 13
6	2F4H	RWr 14
	2F5H	RWr 15
	2F6H	RWr 16
	2F7H	RWr 17
7	2F8H	RWr 18
	2F9H	RWr 19
	2FAH	RWr 1A
	2FBH	RWr 1B
8	2FCH	RWr 1C
	2FDH	RWr 1D
	2FEH	RWr 1E
	2FFH	RWr 1F

Station number	BFM number	Remote register number
9	300H	RWr 20
	301H	RWr 21
	302H	RWr 22
	303H	RWr 23
10	304H	RWr 24
	305H	RWr 25
	306H	RWr 26
	307H	RWr 27
11	308H	RWr 28
	309H	RWr 29
	30AH	RWr 2A
	30BH	RWr 2B
12	30CH	RWr 2C
	30DH	RWr 2D
	30EH	RWr 2E
	30FH	RWr 2F
13	310H	RWr 30
	311H	RWr 31
	312H	RWr 32
	313H	RWr 33
14	314H	RWr 34
	315H	RWr 35
	316H	RWr 36
	317H	RWr 37
15	318H	RWr 38
	319H	RWr 39
	31AH	RWr 3A
	31BH	RWr 3B

4.4.10 Link special relay (SB) and link special register (SW)

1) Link special relay (SB)

The data link status is stored in the form of bit ON/OFF information.
Buffer memory addresses 5E0H to 5FFH correspond to SB0000 to SB01FF.
For the details of link special relay (SB0000 to SB01FF), refer to Section 9.3.
The table below shows the relationship between the buffer memory addresses 5E0H to 5FFH and SB0000 to SB01FF.

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b33	b2	b1	b0
5E0H	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
5E1H	1F	1E	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10
5E2H	2F	2E	2D	2C	2B	2A	29	28	27	26	25	24	23	22	21	20
5E3H	3F	3E	3D	3C	3B	3A	39	38	37	36	35	34	33	32	31	30
5E4H	4F	4E	4D	4C	4B	4A	49	48	47	46	45	44	43	42	41	40
5E5H	5F	5E	5D	5C	5B	5A	59	58	57	56	55	54	53	52	51	50
5E6H	6F	6E	6D	6C	6B	6A	69	68	67	66	65	64	63	62	61	60
5E7H	7F	7E	7D	7C	7B	7A	79	78	77	76	75	74	73	72	71	70
5E8H	8F	8E	8D	8C	8B	8A	89	88	87	86	85	84	83	82	81	80
5E9H	9F	9E	9D	9C	9B	9A	99	98	97	96	95	94	93	92	91	90
5EAH	AF	AE	AD	AC	AB	AA	A9	A8	A7	A6	A5	A4	A3	A2	A1	A0
5EBH	BF	BE	BD	BC	BB	BA	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
5ECH	CF	CE	CD	CC	CB	CA	C9	C8	C7	C6	C5	C4	C3	C2	C1	C0
5EDH	DF	DE	DD	DC	DB	DA	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
5EEH	EF	EE	ED	EC	EB	EA	E9	E8	E7	E6	E5	E4	E3	E2	E1	E0
5EFH	FF	FE	FD	FC	FB	FA	F9	F8	F7	F6	F5	F4	F3	F2	F1	F0
5F0H	10F	10E	10D	10C	10B	10A	109	108	107	106	105	104	103	102	101	100
5F1H	11F	11E	11D	11C	11B	11A	119	118	117	116	115	114	113	112	111	110
5F2H	12F	12E	12D	12C	12B	12A	129	128	127	126	125	124	123	122	121	120
5F3H	13F	13E	13D	13C	13B	13A	139	138	137	136	135	134	133	132	131	130
5F4H	14F	14E	14D	14C	14B	14A	149	148	147	146	145	144	143	142	141	140
5F5H	15F	15E	15D	15C	15B	15A	159	158	157	156	155	154	153	152	151	150
5F6H	16F	16E	16D	16C	16B	16A	169	168	167	166	165	164	163	162	161	160
5F7H	17F	17E	17D	17C	17B	17A	179	178	177	176	175	174	173	172	171	170
5F8H	18F	18E	18D	18C	18B	18A	189	188	187	186	185	184	183	182	181	180
5F9H	19F	19E	19D	19C	19B	19A	199	198	197	196	195	194	193	192	191	190
5FAH	1AF	1AE	1AD	1AC	1AB	1AA	1A9	1A8	1A7	1A6	1A5	1A4	1A3	1A2	1A1	1A0
5FBH	1BF	1BE	1BD	1BC	1BB	1BA	1B9	1B8	1B7	1B6	1B5	1B4	1B3	1B2	1B1	1B0
5FCH	1CF	1CE	1CD	1CC	1CB	1CA	1C9	1C8	1C7	1C6	1C5	1C4	1C3	1C2	1C1	1C0
5FDH	1DF	1DE	1DD	1DC	1DB	1DA	1D9	1D8	1D7	1D6	1D5	1D4	1D3	1D2	1D1	1D0
5FEH	1EF	1EE	1ED	1EC	1EB	1EA	1E9	1E8	1E7	1E6	1E5	1E4	1E3	1E2	1E1	1E0
5FFH	1FF	1FE	1FD	1FC	1FB	1FA	1F9	1F8	1F7	1F6	1F5	1F4	1F3	1F2	1F1	1F0

2) Link special register (SW)

The data link status is stored in the form of word information.
Buffer memory addresses 600_H to $7FF_H$ correspond to SW0000 to SW01FF.
For the details of link special register (SW0000 to SW01FF), refer to Section 9.3.

5. Functions

This chapter describes the functions of the CC-Link master block for the FX Series.

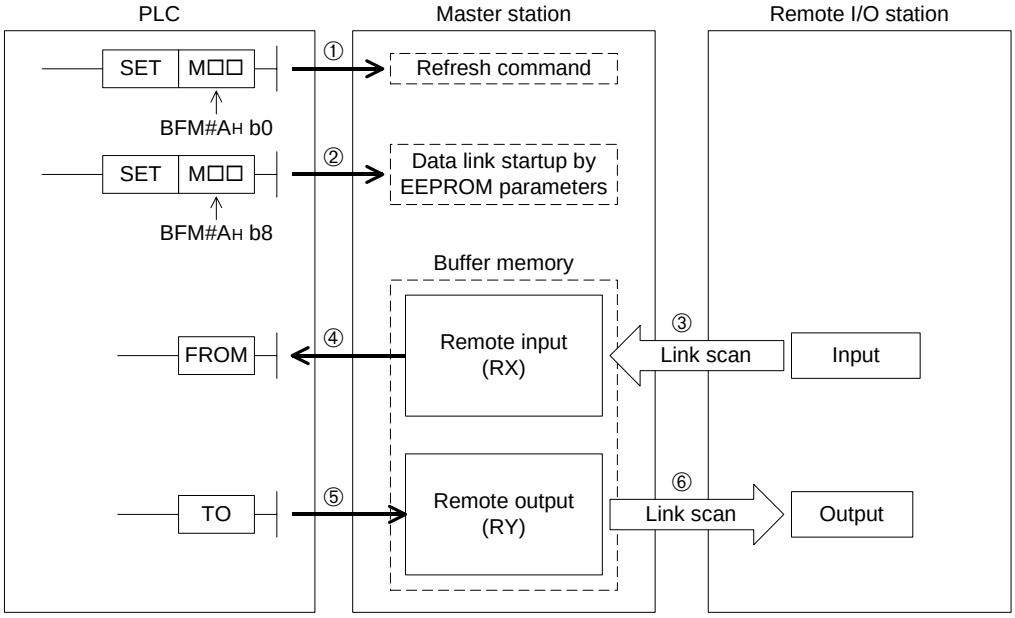
5.1 Function List

Table 5.1:

Item		Function summary	Reference
Communication between master station and remote I/O stations		Transfers the ON/OFF information with remote I/O stations.	5.2
Communication between master station and remote device stations		Transfers the ON/OFF information and the numeric data with remote device stations.	5.3
Communication in compound system		Transfers data with remote I/O stations and remote device stations.	5.4
Reserved station function		Sets remote stations to be connected in the future as reserved ones so that such stations are not handled as data link faulty stations. If a connected station is set as a reserved one, data link is disabled in the station.	5.5
Error invalid station function		Sets remote stations as "error invalid" so that such stations are not handled as data link faulty stations.	5.6
Data link status setting against error in master station PLC CPU		Sets the data link status for a case in which an operation stop error occurs in the master station PLC.	5.7
Parameter registration to EEPROM		Registers the parameters to the EEPROM built in the master module so that the parameters do not have to be written every time the master module starts up.	7.1.1
Setting of input data status from data link faulty station		Sets the status (clear or keep) of the data input (received) from a station in which data link fails due to power OFF, etc.	5.8
Module reset function from sequence program		Resets a module from a sequence program without resetting the PLC when the switch settings are changed or an error occurs in the module.	5.9
Data link stop/restart		Stops and restarts the data link while the data link is executed by the write request for data link startup by buffer memory parameters (BFM#AH b6) or the write request for data link startup by EEPROM parameters (BFM#AH b8).	5.10
RAS function	Automatic return function	Allows a module which was disconnected from the data link by power OFF, etc. to automatically join the data link again when it recovers normal status.	5.11.1
	Slave station cutoff function	Cuts off only modules in which data link is disabled by power OFF, etc., and continues the data link using only normal modules.	5.11.2
	Data link status check (SB/SW)	Allows to check the data link status. This function is useful to interlock in a sequence program, etc.	9.3
	Offline test	Executes the following tests: • Hardware test: Checks operations in a single module. • Line test: Checks the connection status of modules. • Parameter verification test: Verifies the contents of the preset parameters.	8.3 8.7 8.8

5.2 Communication between Master Station and Remote I/O Stations

This section describes the overview of the communication between the master station and remote I/O stations.



[Data link startup]

1) The PLC sets to ON the write refresh command (BFM#AH b0), and makes the data of the remote output (RY) effective.
   When the write refresh command (BFM#AH b0) is OFF, all data of the remote output (RY) is treated as "0 (OFF)".

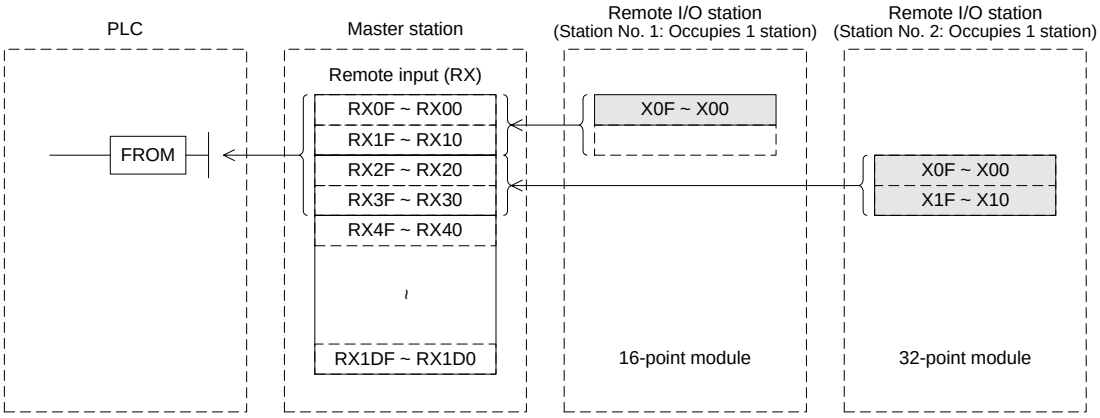
2) The PLC sets to ON the write data link startup by EEPROM parameters (BFM#AH b8) to start the data link.
   However, parameters should be registered to the EEPROM in advance.
   When the data link starts normally, the read data link status in host station (BFM#AH b1) turns ON.

Point
The data link can be started also from the parameters written in the "parameter information area" in the buffer memory. (Refer to Chapter 7.)

[Remote input]

3) The input status of the remote I/O stations is automatically (for each link scan) stored in the buffer memory "remote input (RX)" in the master station.

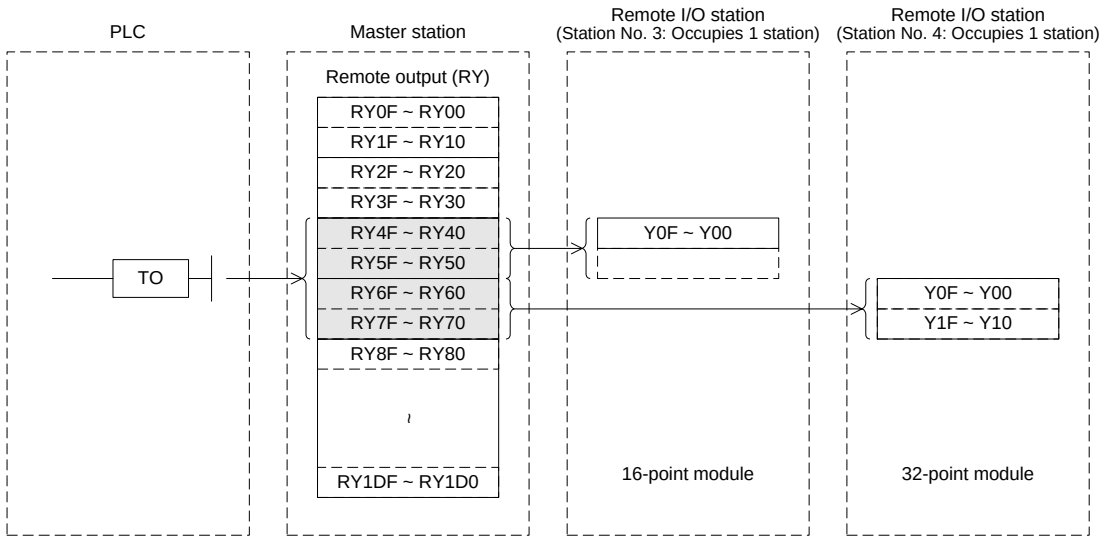
4) The PLC receives the input status stored in the buffer memory "remote input (RX)" using the FROM instruction.



[Remote output]

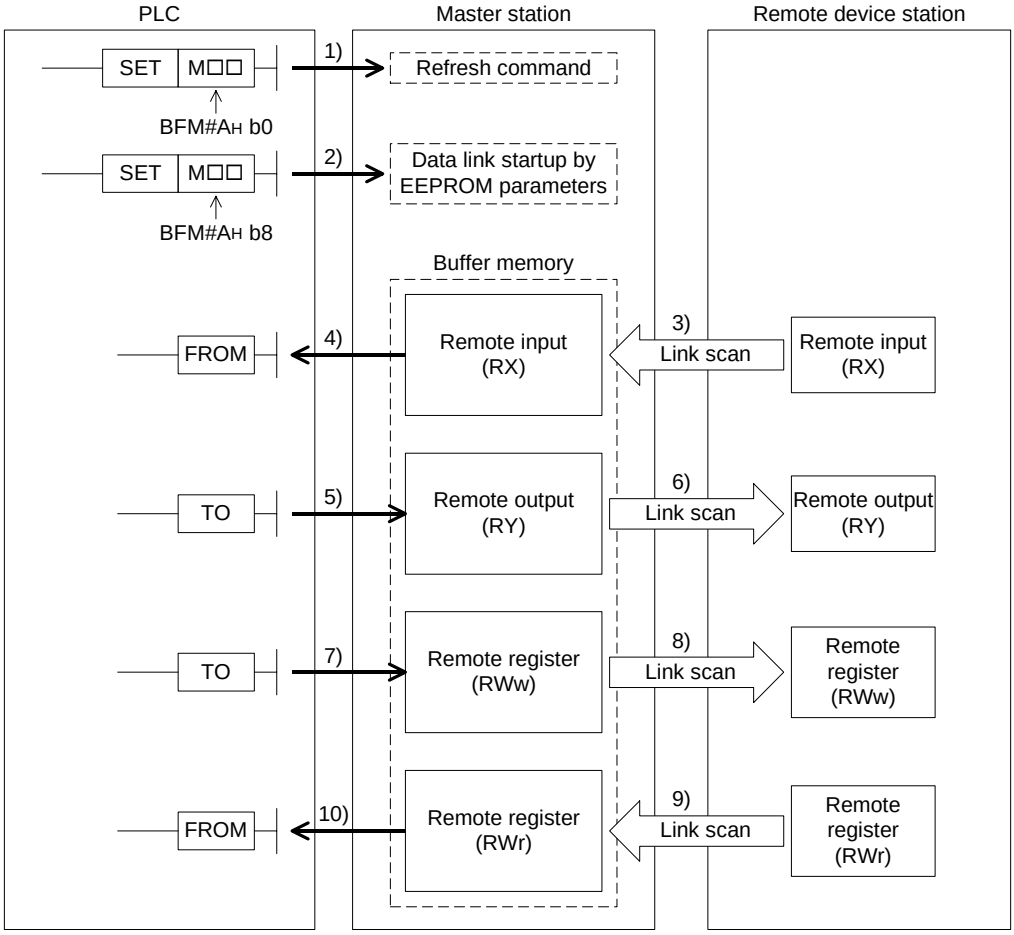
5) The PLC writes the ON/OFF information output from the remote I/O station to the buffer memory "remote output (RY)" using the TO instruction.

6) The output status stored in the buffer memory "remote output (RY)" is automatically (for each link scan) output from the remote I/O stations.



5.3 Communication between Master Station and Remote Device Stations

This section describes the overview of the communication between the master station and remote device stations.



[Data link startup]

1) The PLC sets to ON the write refresh command (BFM#AH b0), and makes the data of the remote output (RY) effective.
   When the write refresh command (BFM#AH b0) is OFF, all data of the remote output (RY) is treated as "0 (OFF)".

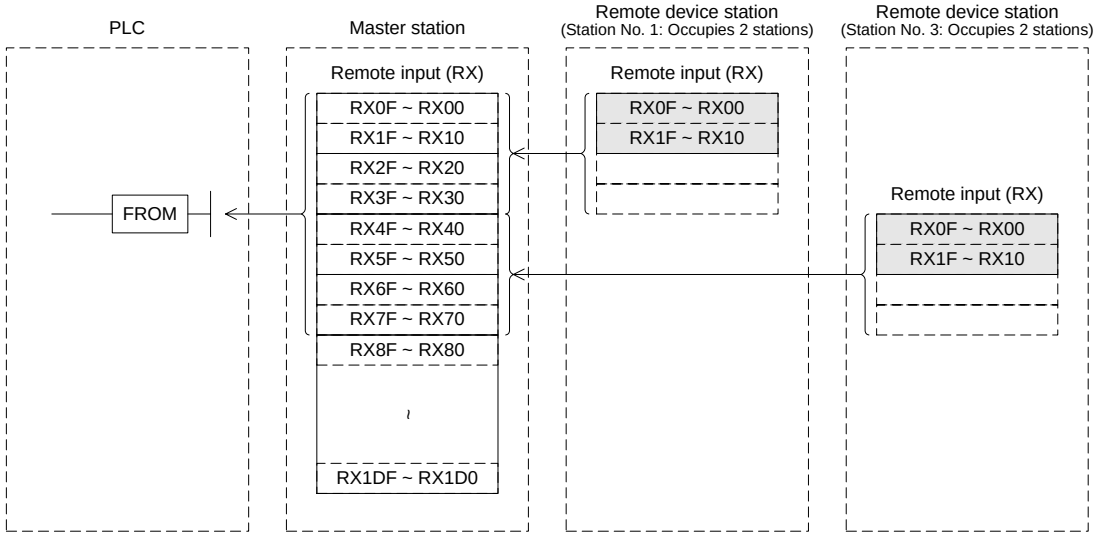
2) The PLC sets to ON the write data link startup (BFM#AH b8) by EEPROM parameters to start the data link.
   However, parameters should be registered to the EEPROM in advance.
   When the data link starts normally, the read data link status in host station (BFM#AH b1) turns ON.

Point
The data link can be started also from the parameters written in the "parameter information area" in the buffer memory. (Refer to Chapter 7.)

[Remote input]

3) The remote input (RX)of the remote device stations is automatically (for each link scan) stored in the buffer memory "remote input (RX)" in the master station.

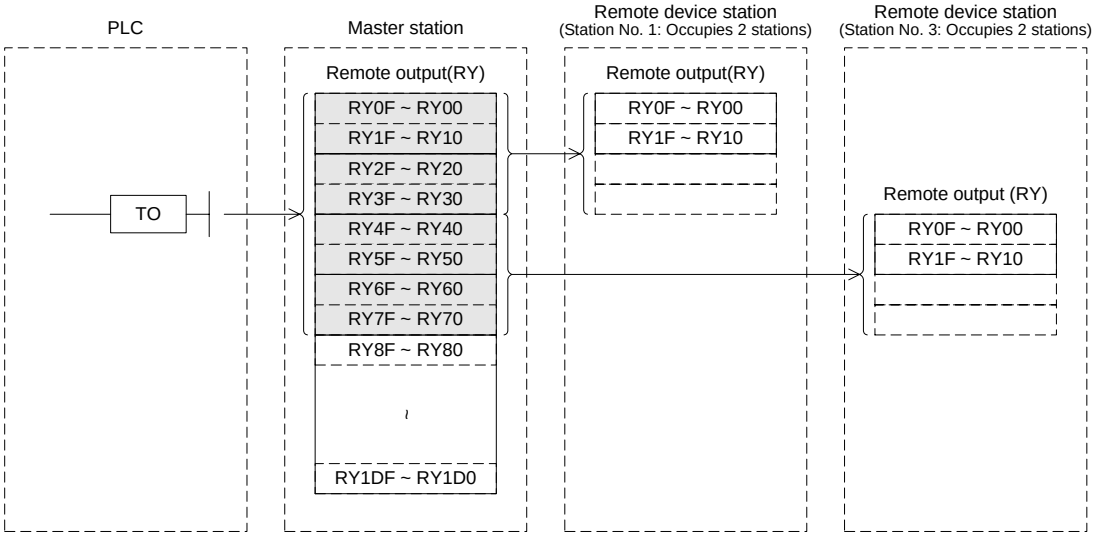
4) The PLC receives the input status stored in the buffer memory "remote input (RX)" using the FROM instruction.



[Remote output]

5) The PLC writes the ON/OFF information of the remote output (RY) in the remote device stations to the buffer memory "remote output (RY)" using the TO instruction.

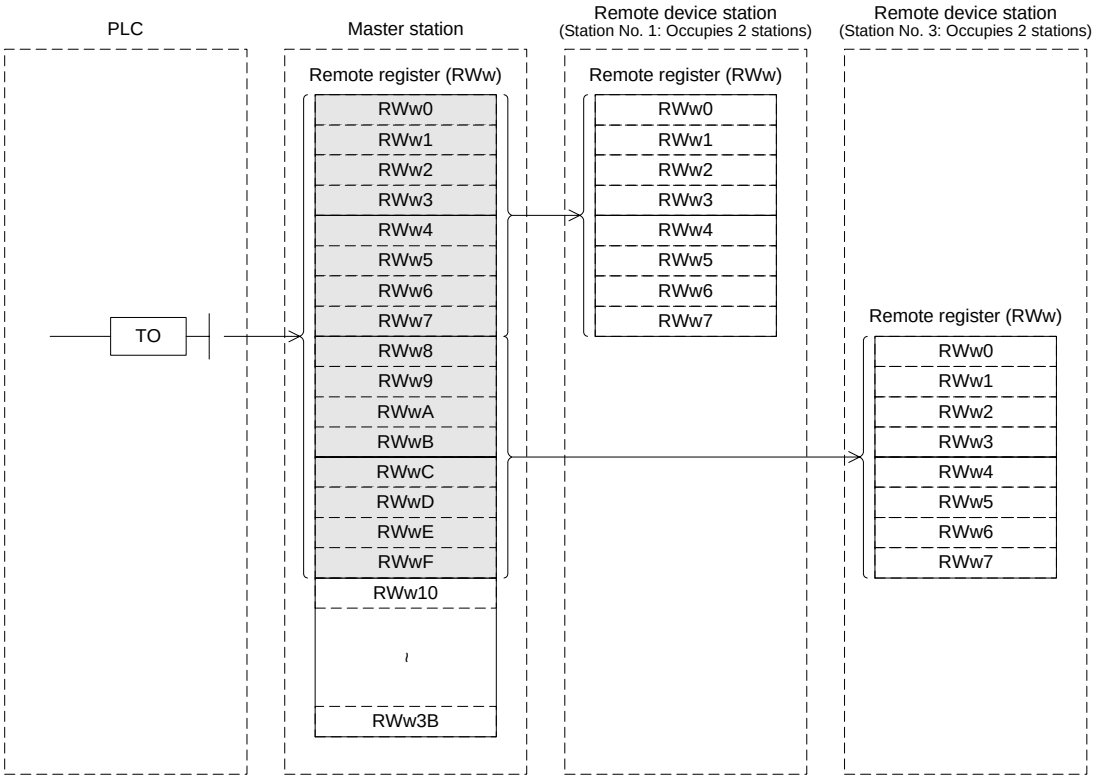
6) The remote output (RY) in the remote device stations is automatically (for each link scan) set to ON or OFF in accordance with the output status stored in the buffer memory "remote output (RY)".



[Write to remote register (RWw)]

7) The PLC writes the transmission data to the buffer memory "remote register (RWw)" using the TO instruction.

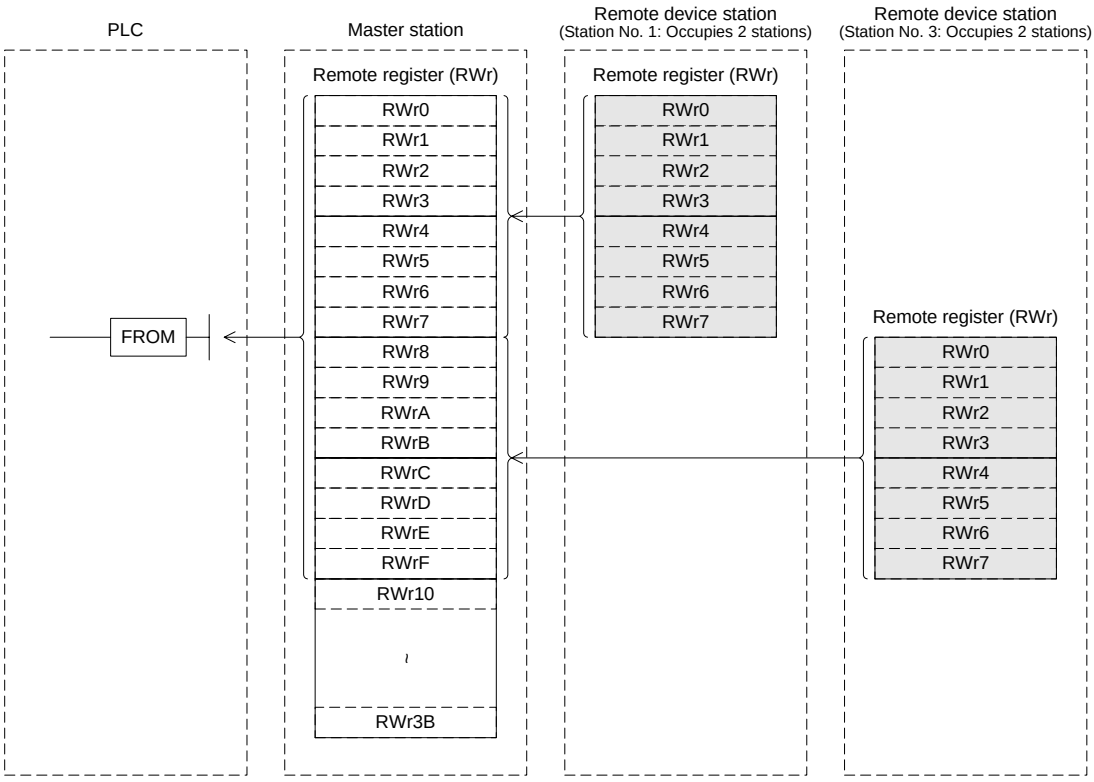
8) The data stored in the buffer memory "remote register (RWw)" is automatically transmitted to the remote register (RWw) in the remote device stations.



[Read from remote register (RWr)]

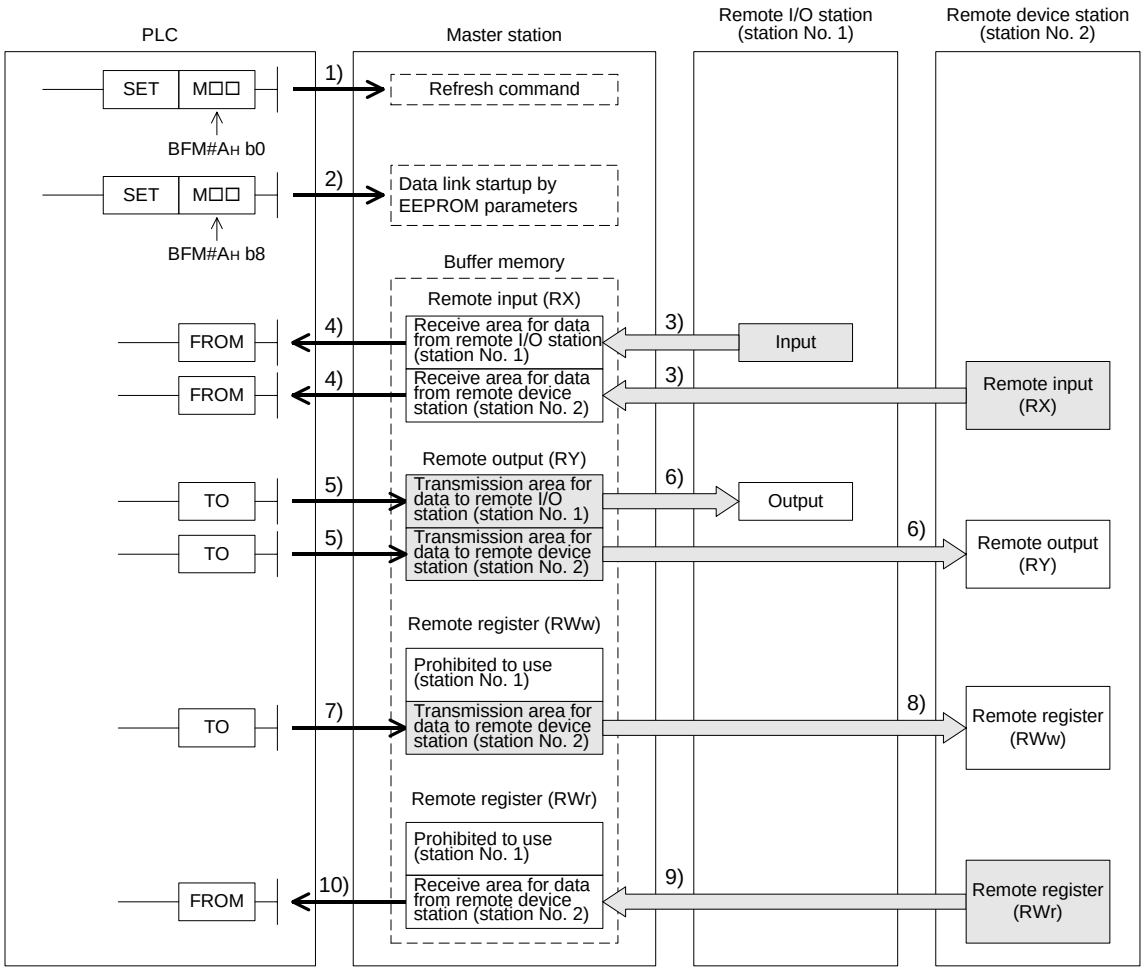
9) The data of the remote register (RWr) in the remote device stations is automatically stored in the buffer memory "remote register (RWr)" in the master station.

10) The PLC receives the data of the remote register (RWr) in the remote device stations stored in the buffer memory "remote register (RWr)" using the FROM instruction.



5.4 Communication in Compound System

This section describes the overview of the communication in the system in which remote I/O stations and remote device stations exist together.



[Data link startup]

1) The PLC sets to ON the write refresh command (BFM#A_H b0), and makes the data of the remote output (RY) effective.
   When the write refresh command (BFM#A_H b0) is OFF, all data of the remote output (RY) is treated as "0 (OFF)".

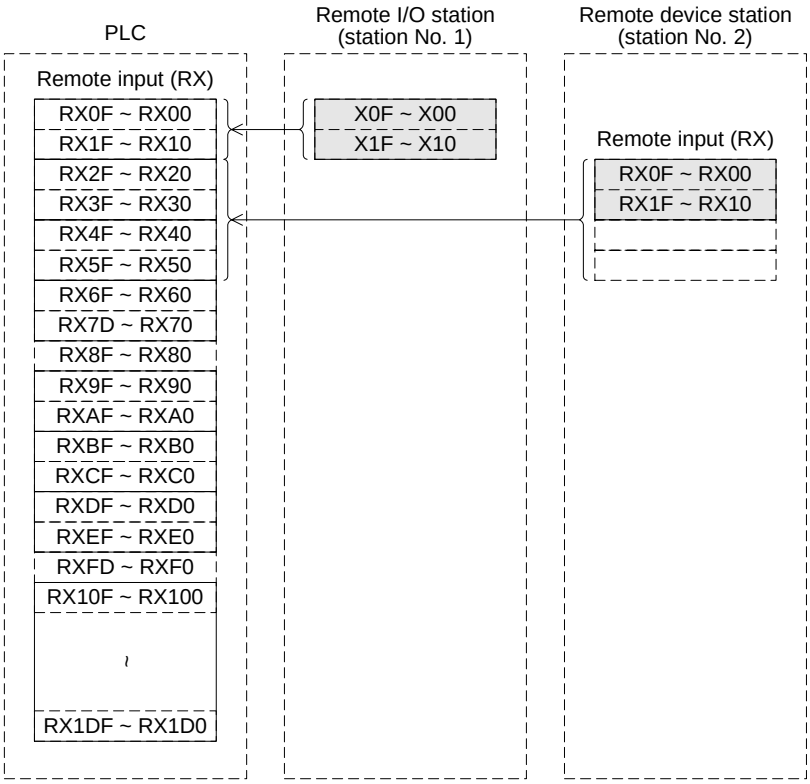
2) The PLC sets to ON the write data link startup (BFM#A_H b8) by EEPROM parameters to start the data link.
   However, parameters should be registered in the EEPROM in advance.
   When the data link starts normally, the read data link status in host station (BFM#A_H b1) turns ON.

Point
The data link can be started also from the parameters written in the "parameter information area" in the buffer memory. (Refer to Chapter 7.)

[ON/OFF information from the remote I/O station/remote device station to the master station]

3) The input status of the input (X) in the remote I/O station and the remote input (RX)in the remote device station is automatically (for each link scan) stored in the buffer memory "remote input (RX)" in the master station.

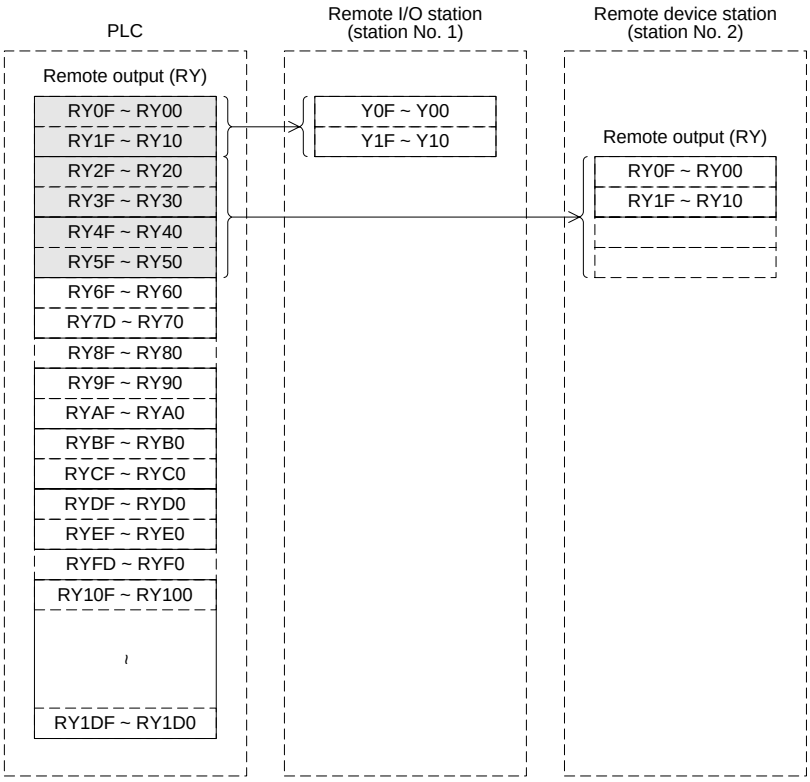
4) The PLC receives the input status stored in the buffer memory "remote input (RX)" using the FROM instruction.



[ON/OFF information from the master station to the remote I/O station/remote device station]

5) The PLC writes the ON/OFF information to be transmitted to the remote I/O station and the remote device station to the buffer memory "remote output (RY)" in the master station using the TO instruction.

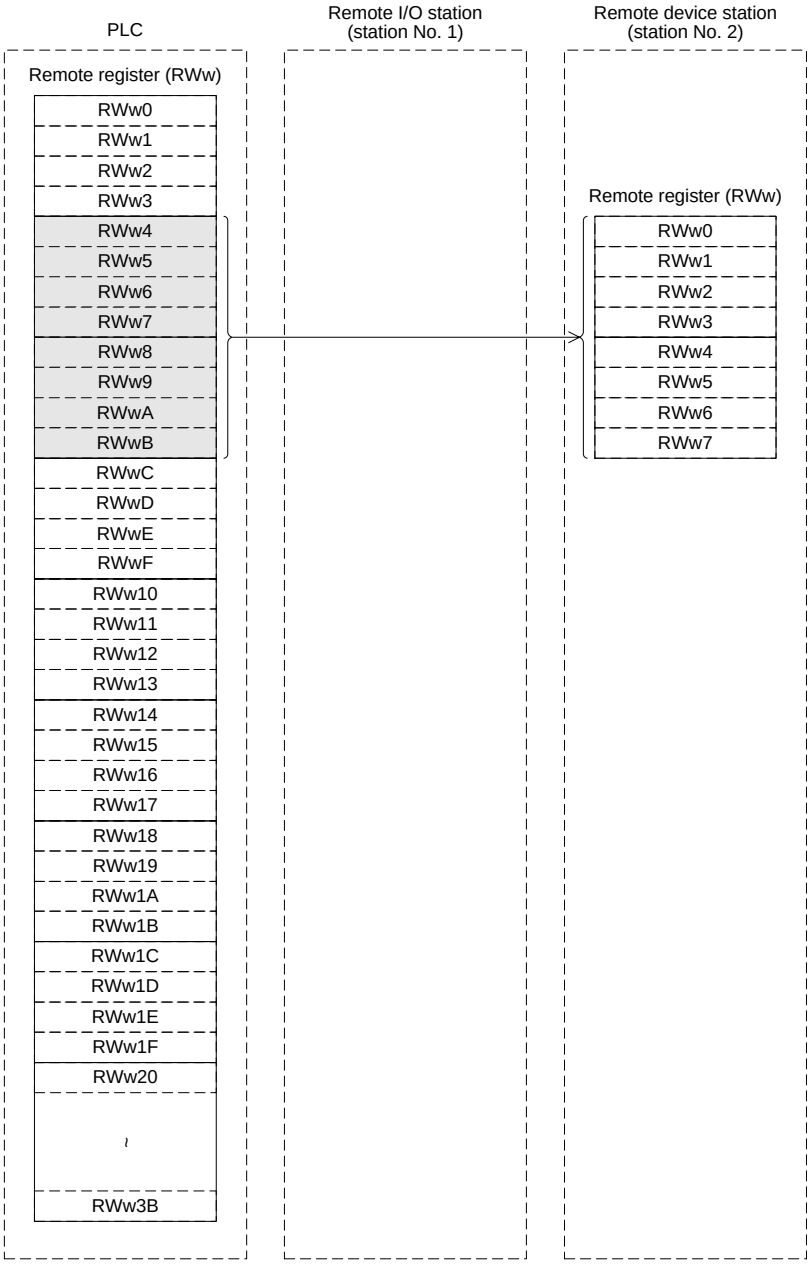
6) The output status of the buffer memory "remote output (RY)" in the master station is automatically (for each link scan) transmitted to the output (Y) in the remote I/O station and the remote output (RY) in the remote device station.



[Word information from the master station to the remote device station]

7) The PLC writes the word information to be transmitted to the remote device station to the buffer memory "remote register (RWw)" in the master station using the TO instruction.

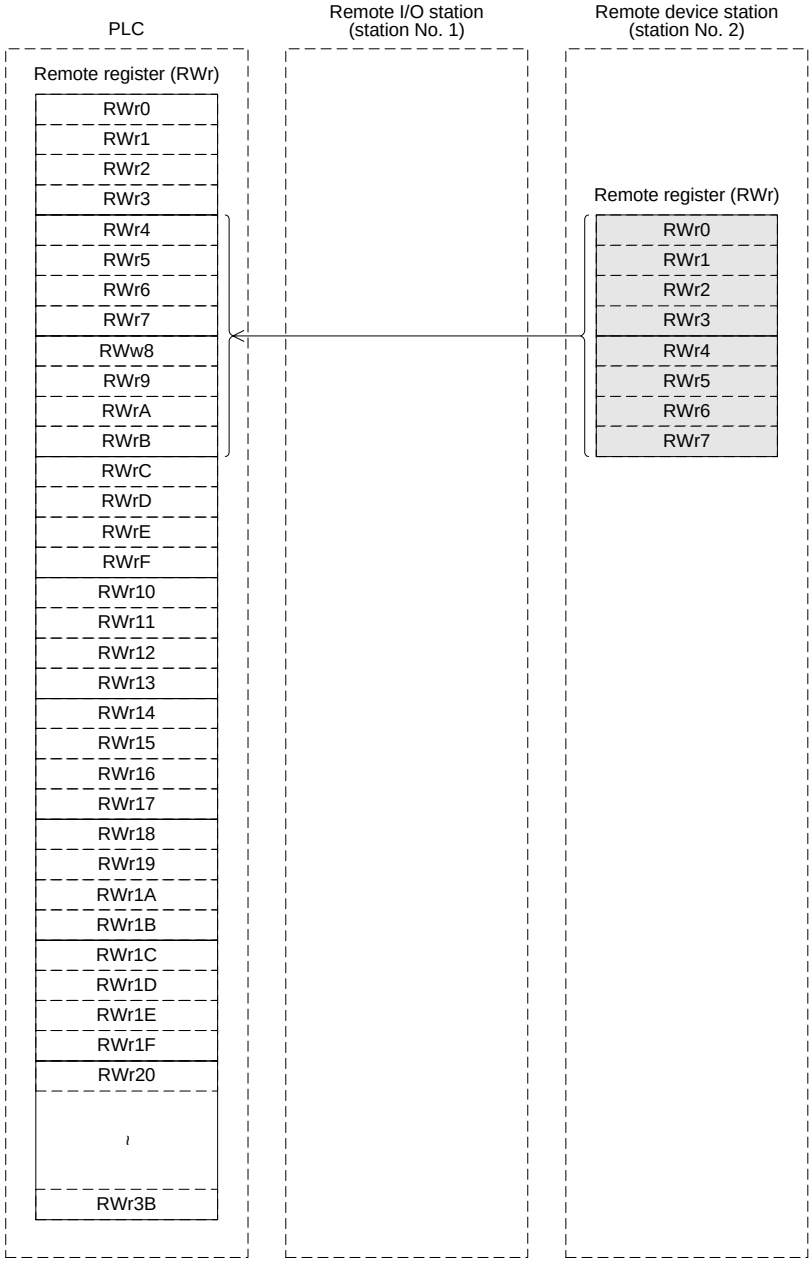
8) The information of the buffer memory "remote register (RWw)" is automatically (for each link scan) stored in the remote register (RWw) in the remote device station.



[Word information from the remote device station to the master station]

9) The data of the remote register (RWr) in the remote device station is automatically (for each link scan) stored in the remote register (RWr) in the master station.

10) The PLC receives the data of the remote device station stored in the buffer memory "remote register (RWr)" using the FROM instruction.



5.5 Reserved Station Function

This function sets remote stations to be connected in the future (which are not currently connected) as reserved ones so that such stations are not handled as data link faulty stations.

Point
If a connected remote station is set as a reserved one, data link is disabled in the remote station.

1) Setting method

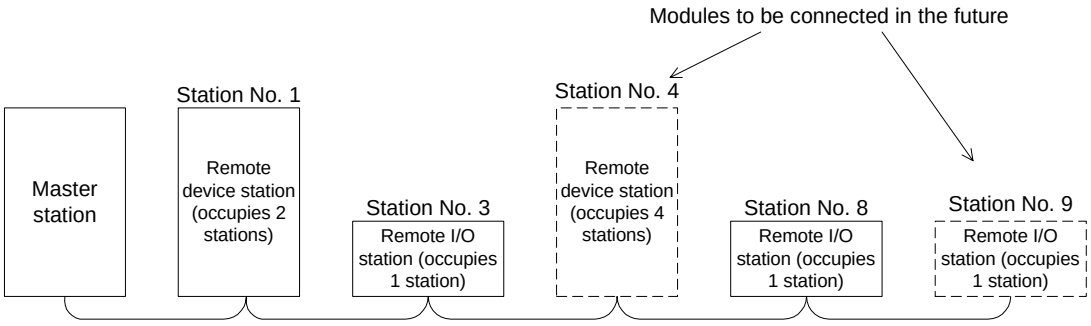
Specify reserved stations using the parameter BFM#10H.
Set to ON the bits corresponding to the station numbers of the stations to be reserved.
However, for a remote station module occupying two or more stations, set to ON only the bit corresponding to the station number set by the station number setting switch in the module.
The table below shows the buffer memory configuration. (Numbers 1 to 15 indicate station numbers)

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
BFM# 10H	—	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

2) Setting example

a) System configuration example

When one remote device station and one remote I/O station are to be connected in the future to the system in which two remote I/O stations and one remote device station are connected



b) Buffer memory setting example

Set to ON the 3rd bit corresponding to the station No. 4 and the 8th bit corresponding to the station No. 9. (Set "108H" to the BFM#10H.)

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
BFM# 10H	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0
	0				1				0				8			

5.6 Error Invalid Station Function

This function sets remote stations in which data link is disabled by power OFF, etc. as error invalid ones so that such stations are not handled as data link faulty stations.
Be careful, however, for errors will not be detected at all in stations set as invalid stations.

Point
If a remote station set as invalid station is also set as reserved station, the reserved station function has the priority.

1) Setting method

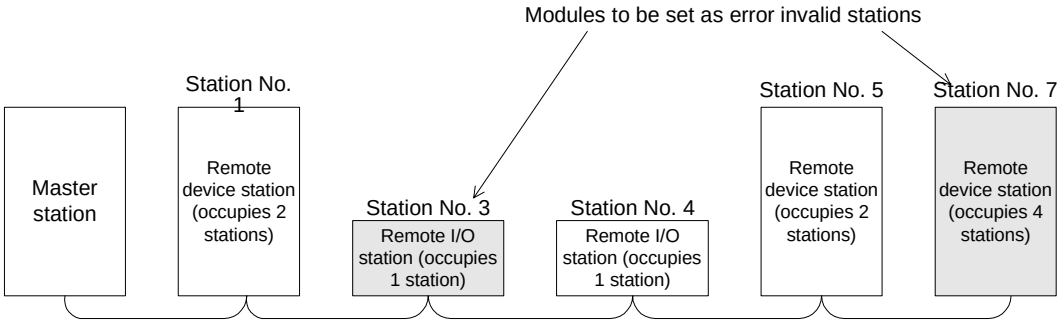
Specify invalid stations using the parameter BFM#14H
Set to ON the bits corresponding to the station numbers of the stations to be made invalid. However, for a remote station occupying two or more stations, set to ON only the bit corresponding to the station number set by the station number setting switch in the module. The table below shows the buffer memory configuration. (Numbers 1 to 15 indicate station numbers)

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
BFM# 14H	—	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

2) Setting example

a) System configuration example

When the remote I/O station No. 3 and the remote device station No. 7 are made invalid in the system in which three remote I/O stations and two remote device stations are connected



b) Buffer memory setting example

Set to ON the 2nd bit corresponding to the station No. 3 and the 6th bit corresponding to the station No. 7. (Set "44H" to the BFM#14H.)

	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
BFM# 14H	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
	0				0				4				4			

5.7 Data Link Status Setting against Error in Master Station PLC

This function sets the data link status for a case in which an operation stop error occurs in the master station PLC.

Point
Even if an operation continue error occurs in the master station PLC, the data link continues.

[Setting method]

Set the operation status to the parameter information area "operation specification against CPU down (BFM# 6_H)" in the buffer memory in the master station.

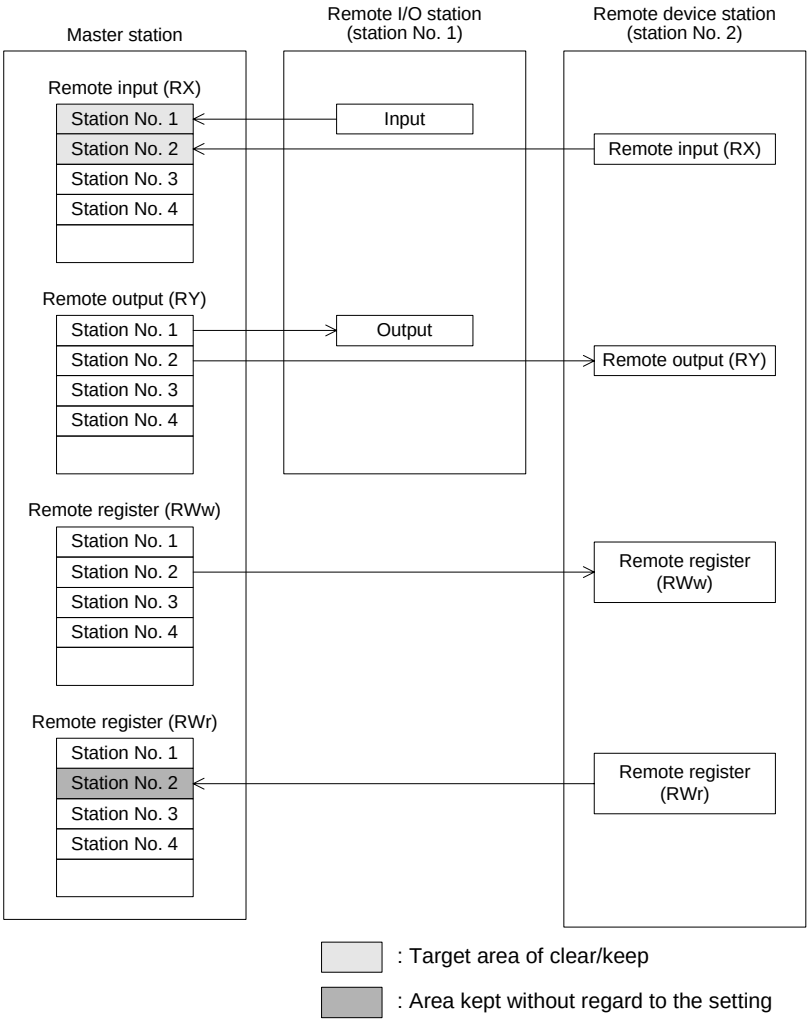
0: Stop (default)
1: Continue

5.8 Setting of Input Data Status from Data Link Faulty Station

The status of the data input (received) from a data link faulty station can be set.

1) Target input (received) data

The figure below shows the buffer memory area regarded as the setting target.



2) Setting method

Set the status using the condition setting DIP switch SW4 in the master block.

OFF: Clear (setting at shipment)

ON : Keeps the status right before error

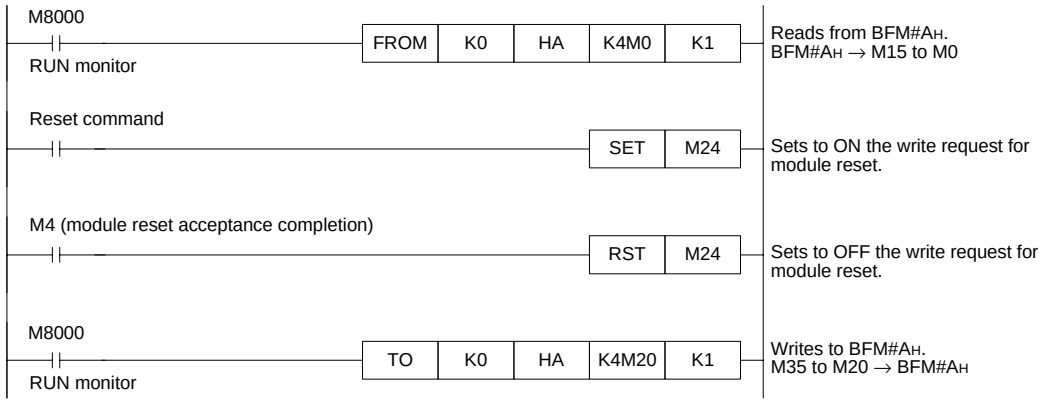
Point
When a data link faulty station is set as error invalid station, the data (remote input RX and remote output RY) input from the station is kept without regard to the setting of the SW4.

5.9 Module Reset Function from Sequence Program

This function resets a module from a sequence program without resetting the PLC or the master block when the switch settings are changed or an error occurs in the master block.
However, reset is disabled when there is an read module error (when the BFM#AH b0 is ON).

> **Point**
>
> Because the PLC is not initialized, operations of other modules are not affected at all.

The figure below shows a program example for module reset.



> **Remarks**
>
> Change from the mode 0 or the mode 2 to the test mode cannot be executed by the write request for module reset (BFM#AH b4).
> For such a change, turn off the power, then turn it on again.

5.10 Data Link Stop/Restart

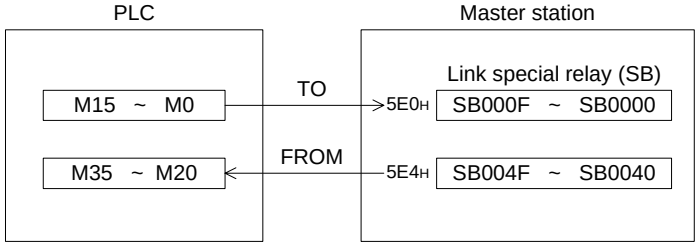
This function stops and restarts the data link in the host station.
When the data link is stopped in the master station, the data link is stopped in the entire system.

1) The following link special relays are used in programs:

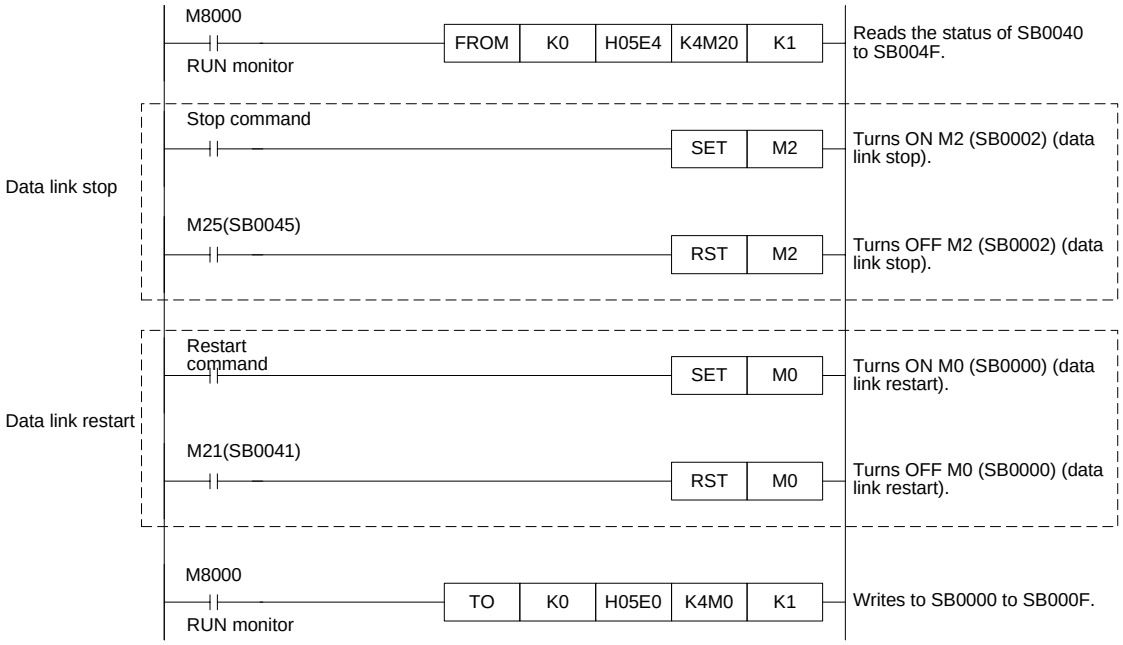
SB0000: Request for data link restart
SB0002: Request for data link stop
SB0041: Completion of data link restart
SB0045: Completion of data link stop

2) The figure below shows a program example to stop/restart the data link.

1) Relationship between the PLC and the master station



2) Program example



Point
When you have stopped the data link using SB0002, make sure to start up the data link using SB0000.

5.11 RAS Function

The term "RAS" stands for "reliability, availability and serviceability", and refers to the total operability of an automated facility.

5.11.1 Automatic return function

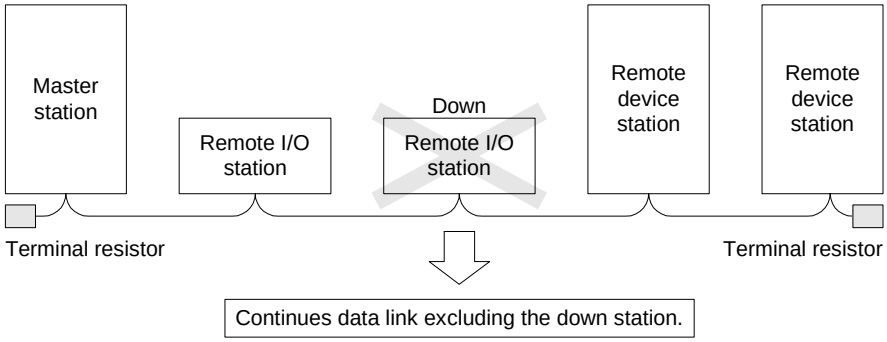
This function allows a module which was disconnected from the data link by power OFF, etc. to automatically join the data link again when it recovers the normal status.
Set the automatic return function using the mode setting switch.

Table 5.2:

Mode setting switch	Setting description	Remarks
0	Online (automatic return allowed)	—
1	Unusable	—
2	Offline	Data link disabled (disconnected status)

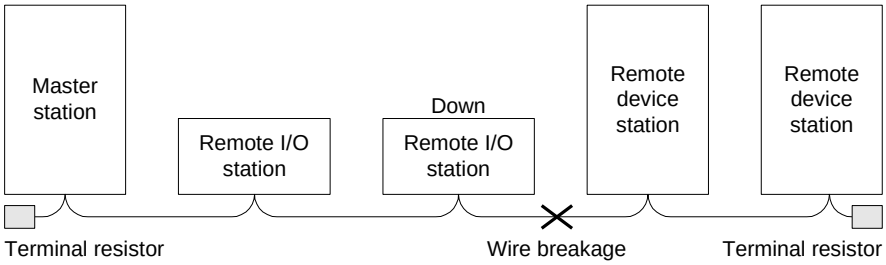
5.11.2 Slave station cutoff function

This function cuts off only remote stations in which data link is disabled by power OFF, etc., and continues the data link using only normal remote stations.



Point

When a cable is broken, the data link is disabled in the entire system because terminal resistors do not function any more.



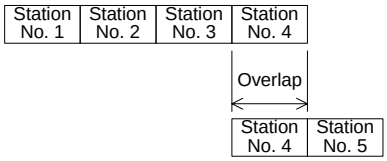
5.11.3 Station number overlap check function

This function checks the status of actually connected stations when the write request for data link start is given (when BFM#AH b6/b8 is set to ON), and checks whether the assigned station numbers overlap.

Example:

Remote device station (station No. 1 occupying 4 stations)

Remote device station (station No. 4 occupying 2 stations)

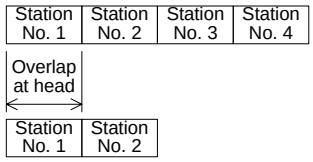


However, if the starting head number overlaps, it is not regarded as an overlap check target.

Example:

Remote device station (station No. 1 occupying 4 stations)

Remote device station (station No. 1 occupying 2 stations)



1) When there is an overlap, the M/S LED flashes and the overlap status is stored in SW0098.
2) Even if overlap exists, data link can be continued with other normally functioning stations.
3) When the switch setting is corrected to the normal status and the write request for data link startup is given again (BFM#AH b6/b8 is set to ON), the M/S LED turns off and the data stored in SW0098 is cleared.

5.12 Temporary Error Invalid Station Specification Function

This function allows a remote station to be replaced in the online status without detecting an error in the corresponding module.
Different from the error invalid station specification by parameters, error invalid stations can be temporarily specified with arbitrary timing.

5.12.1 I/O status when temporary error invalid stations are specified

In a station specified as a temporary error invalid station, all the cyclic transmission data is refreshed.
If an error occurs in a station specified as a temporary error invalid station, the input is kept and the output is set to OFF.

5.12.2 Link special relays and registers (SB and SW) related to temporary error invalid station specification function

This section describes the link special relays and registers related to the temporary error invalid station specification function.

1) Link special relays (SB)

The table below shows the link special relays (SB) related to the temporary error invalid station specification function.

Table 5.3:

Number	BFM number		Name	Description
	Hex.	Bit		
SB0004	5E0H	b4	Request for temporary error invalid station	Determines the stations specified by SW0003 to SW0004 as temporary error invalid stations. OFF : Request not given ON : Request given
SB0005	5E0H	b5	Request for cancel of temporary error invalid station	Cancels the stations specified by SW0003 to SW0004 from temporary error invalid stations OFF : Request not given ON : Request given
SB0048	5E4H	b8	Temporary error invalid station acceptance status	Indicates the acceptance status of the request for temporary error invalid station. OFF : Not accepted ON : Accepted
SB0049	5E4H	b9	Temporary error invalid station completion status	Indicates the acceptance completion status of the temporary error invalid station request. OFF : Not completed ON : Completed (Determination as temporary error invalid station is completed.)
SB004A	5E4H	b10	Temporary error invalid station cancel acceptance status	Indicates the acceptance status of the request to temporarily cancel the error invalid station. OFF : Not accepted ON : Accepted
SB004B	5E4H	b11	Temporary error invalid station cancel completion status	Indicates the acceptance completion status of the request to temporarily cancel the error invalid station. OFF : Not completed ON : Completed (Cancel of determination as temporary error invalid station is completed.)

2) Link special registers (SW)

The table below shows the link special registers (SW) related to the temporary error invalid station specification function.

Table 5.4:

Number	BFM number Hex.	Name	Description
SW0003	603H	Specification of multiple temporary error invalid stations	Selects whether or not two or more stations are specified as temporary error invalid stations. 00 : Specifies two or more stations stored in SW0004. 01 to 15: Specifies one station (station No. 1 to 15). * The number specifies the station number of a station to be specified as a temporary error invalid station.
SW0004	604H	Specification of temporary error invalid station *1	Specifies temporary error invalid stations. 0: Does not specify as a temporary error invalid station. 1: Specifies as a temporary error invalid station. b15 b14 b13 b12 ~ b3 b2 b1 b0 SW0004 — 15 14 13 ~ 4 3 2 1 Numbers 1 to 15 above indicate the station numbers
SW0049	649H	Temporary error invalid station request result	Stores the execution result of the request for temporary error invalid station by SB0004. 0 : Normal Any value other than 0: Stores an error code. (Refer to Section 13.3.)
SW004B	64BH	Temporary error invalid station cancel request result	Stores the execution result of the request for cancel of temporary error invalid station by SB0005. 0 : Normal Any value other than 0: Stores an error code. (Refer to Section 13.3.)
SW007C	67CH	Temporary error invalid station specification status *1	Stores the temporary error invalid station specification status. 0: Not specified as temporary error invalid station 1: Specified as temporary error invalid station b15 b14 b13 b12 ~ b3 b2 b1 b0 SW007C — 15 14 13 ~ 4 3 2 1 Numbers 1 to 15 above indicate the station numbers

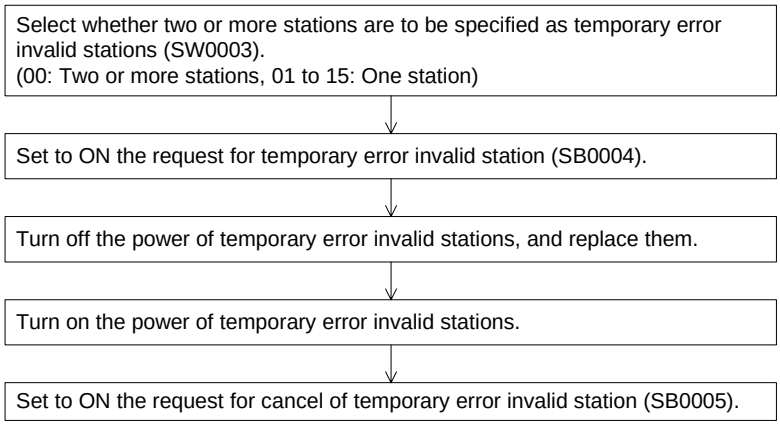
*1 Only the bit of the head station number is set to ON.

Point

1) When both the request for temporary error invalid station and the request for cancel of temporary error invalid station are given at the same time, the request for cancel of temporary error invalid station has the priority.
2) In a station occupying two or more stations, only the head station number is effective.

5.12.3 Temporary error invalid station specification procedure

This section describes the procedure to execute the temporary error invalid station function.



Point

1) Even if the request for temporary error invalid station is executed for a faulty station, the error information is not cleared.
   The temporary error invalid station specification function is effective only to errors which occur after the specification.
2) The request for temporary error invalid and the request for cancel of temporary error invalid station are not effective to stations which are specified as error invalid stations by parameter.

6. Data Link Processing Time

6.1 Status of Each Station when an Error has Occurred

The table below shows the status of each station when an error has occurred.

Table 6.1:

Data link status			Master station			
			Remote input (RX)	**Remote output (RY)**	**Remote register (RWw)**	**Remote register (RWr)**
When the master station PLC is stopped (data link continues)			Continue	Handles "0" in any case. *1	Continue	Continue
When data link is stopped in the entire system	Input data status setting for faulty station (SW4)	Clear	Clear	—	—	Keep
		Keep	Keep			
When a communication error occurred (due to power OFF, etc.) in a remote I/O station	Input data status setting for faulty station (SW4)	Clear	Clears the receive area for data from remote I/O station with a communication error.	Continue	Continue	Continue
		Keep	Keeps the receive area for data from remote I/O station with a communication error.			
When a communication error occurred (due to power OFF, etc.) in a remote device station		Clear	Clears the receive area for data from remote device station with a communication error.	Continue	Continue	Keeps the receive area for data from remote device station with a communication error.
		Keep	Keeps the receive area for data from remote device station with a communication error.			

*1 Because the BFM#AH b0 (refresh command) is set to OFF.

Table 6.2:

Data link status			Remote I/O station		Remote device station			
			Input	Output	Remote input (RX)	Remote output (RY)	Remote register (RWw)	Remote register (RWr)
When the master station PLC is stopped (data link continues)			Continue	All OFF	Continue	All OFF	Continue	Continue
When data link is stopped in the entire system	Input data status setting for faulty station (SW4)	Clear	—	All OFF	—	All OFF	—	—
		Keep						
When a communication error occurred (due to power OFF, etc.) in a remote I/O station	Input data status setting for faulty station (SW4)	Clear	—	All OFF	Continue	Continue	Continue	Continue
		Keep						
When a communication error occurred (due to power OFF, etc.) in a remote device station		Clear	Continue	Continue	—	—	—	—
		Keep						

6.2 Link Scan Time

The link scan time in the CC-Link system is calculated using the expression below.

[Link scan time (LS)]

LS = BT {29.4 + (NI × 4.8) + (NW × 9.6) + (N × 32.4) + (ni × 4.8) + (nw × 9.6)} + ST
+ {Number of communication faulty stations × 48 × BT × Number of retries}* [µs]

BT : Constant (transmission speed)

Transmission speed	156kbps	625kbps	2.5Mbps	5Mbps	10Mbps
BT	51.2	12.8	3.2	1.6	0.8

NI : Last station number in a and b (including the number of occupied stations and excluding the number of reserved stations)

NW : Last station number in b (including the number of occupied stations and excluding the number of reserved stations)

Last station Number	1 to 8	9 to 15
NI,NW	8	16

N : Number of connected modules (excluding reserved station)

ni : a + b (excluding reserved stations)

nw : b (excluding reserved stations)

ST : Constant (larger value of (①) and (②)) (If b is 0, (②) should be ignored.)

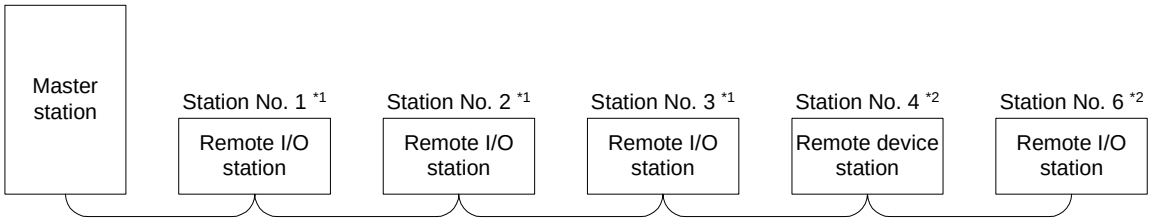
① 800 + (a × 15)
② 900 + (b × 50)

a : Total number of stations occupied by remote I/O stations

b : Total number of stations occupied by remote device stations

* : Only when there are communication faulty stations (including error invalid stations and temporary error invalid stations)

Example: When the transmission speed is 2.5 Mbps in the system configuration below



*1: Occupies 1 station. *2: Occupies 2 station.

BT = 3.2 ST = 1100
NI = 7 → ①800 + (3 × 15) = 845
NW = 7 → ②900 + {(4 × 50) = 1100
a = 3 b = 4
N = 5
ni = 7
nw = 4
LS = 3.2 {29.4 + (8 × 4.8) + (8 × 9.6) + (5 × 32.4) + (7 × 4.8) + (4 × 9.6)} + 1100
= 2311.52 [µs]
= 2.31 [ms]

6.3 Transmission Delay Time

This section describes the transmission delay time (time required for data transmission).

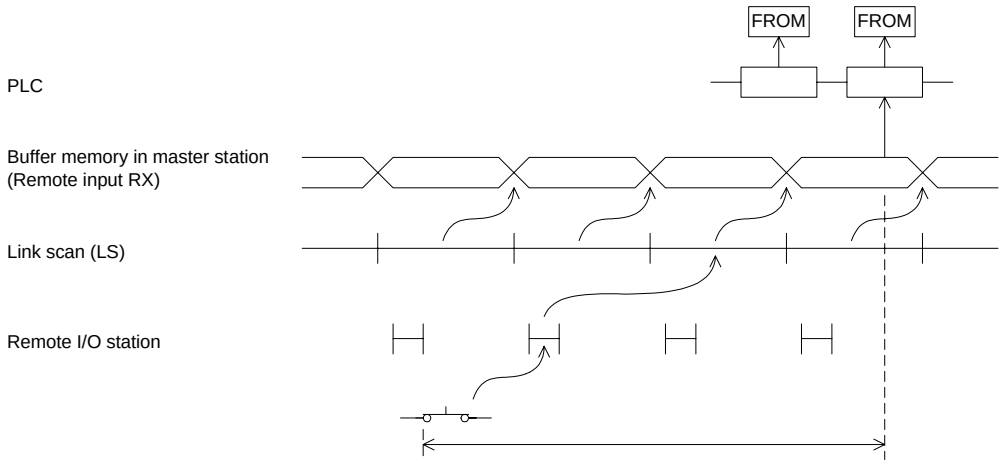
6.3.1 Master station <---> remote I/O station

1) Master station (RX) <-- remote I/O station (input)

[Calculation expression]

SM + LS × 2 + Remote I/O station response time [ms]
SM : Scan time of master station's sequence program
LS : Link scan time (Refer to Section 6.2.)

[Data flow]



2) Master station (RY) --> remote I/O station (output)

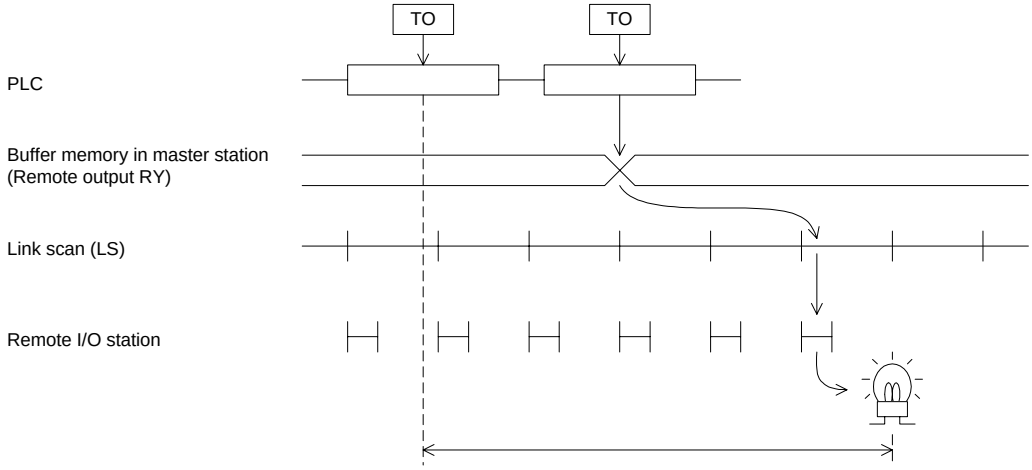
[Calculation expression]

SM + LS × 3 + Remote I/O station response time [ms]

SM : Scan time of master station's sequence program

LS : Link scan time (Refer to Section 6.2.)

[Data flow]



6.3.2 Master station <---> remote device station

1) Master station (RX) --> remote device station (RX)

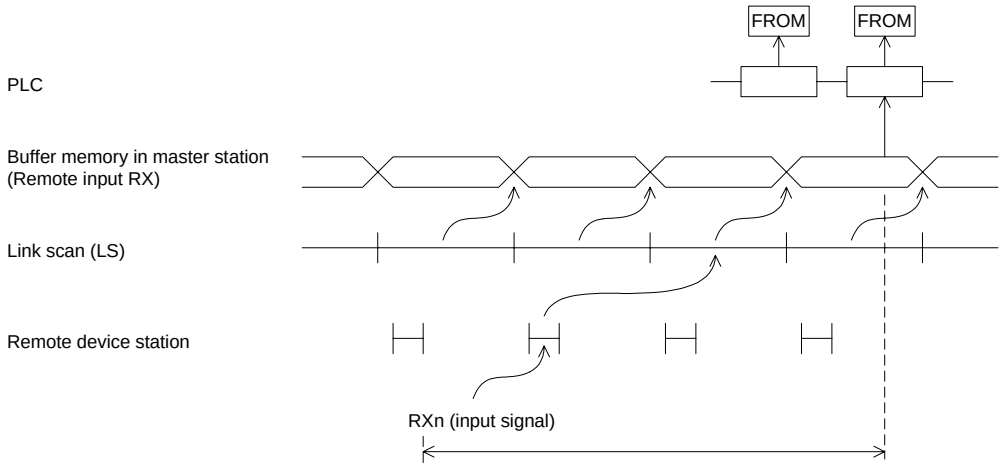
[Calculation expression]

SM + LS × 2 + Remote device station processing time [ms]

SM : Scan time of master station's sequence program

LS : Link scan time (Refer to Section 6.2.)

[Data flow]



2) Master station (RY) --> remote device station (RY)

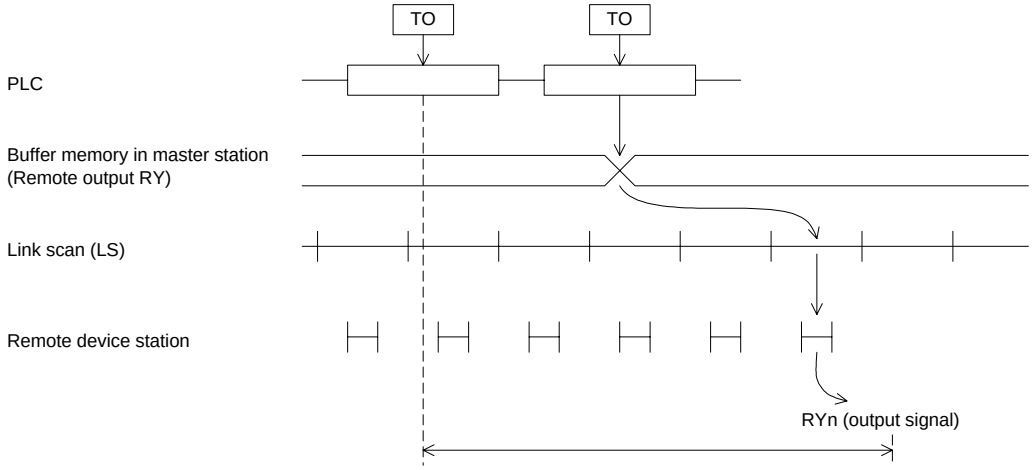
[Calculation expression]

SM + LS × 3 + Remote device station processing time [ms]

SM : Scan time of master station's sequence program

LS : Link scan time (Refer to Section 6.2.)

[Data flow]



3) Master station (RWw) --> remote device station (RWw)

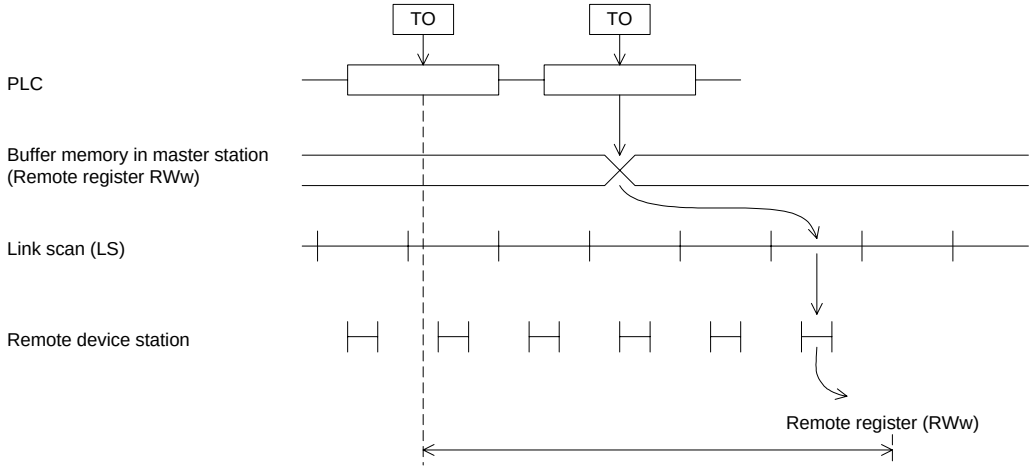
[Calculation expression]

SM + LS × 3 + Remote device station processing time [ms]

SM : Scan time of master station's sequence program

LS : Link scan time (Refer to Section 6.2.)

[Data flow]



4) Master station (RWr) <-- remote device station (RWr)

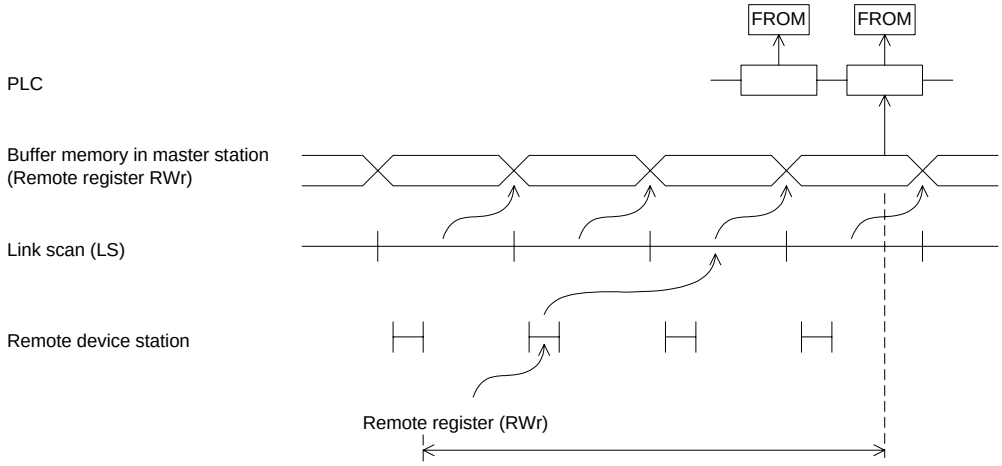
[Calculation expression]

SM + LS × 2 + Remote device station processing time [ms]

SM : Scan time of master station's sequence program

LS : Link scan time (Refer to Section 6.2.)

[Data flow]



MEMO

7. Parameter Setting

This chapter describes the parameter setting required to execute data link in the CC-Link system.

7.1 Procedure from Parameter Setting to Data Link Startup

This section describes the flow from parameter setting to data link startup.

7.1.1 Relationship among buffer memory, EEPROM and internal memory

This section describes the relationship among the buffer memory, the EEPROM and the internal memory in the master station.

1) Buffer memory

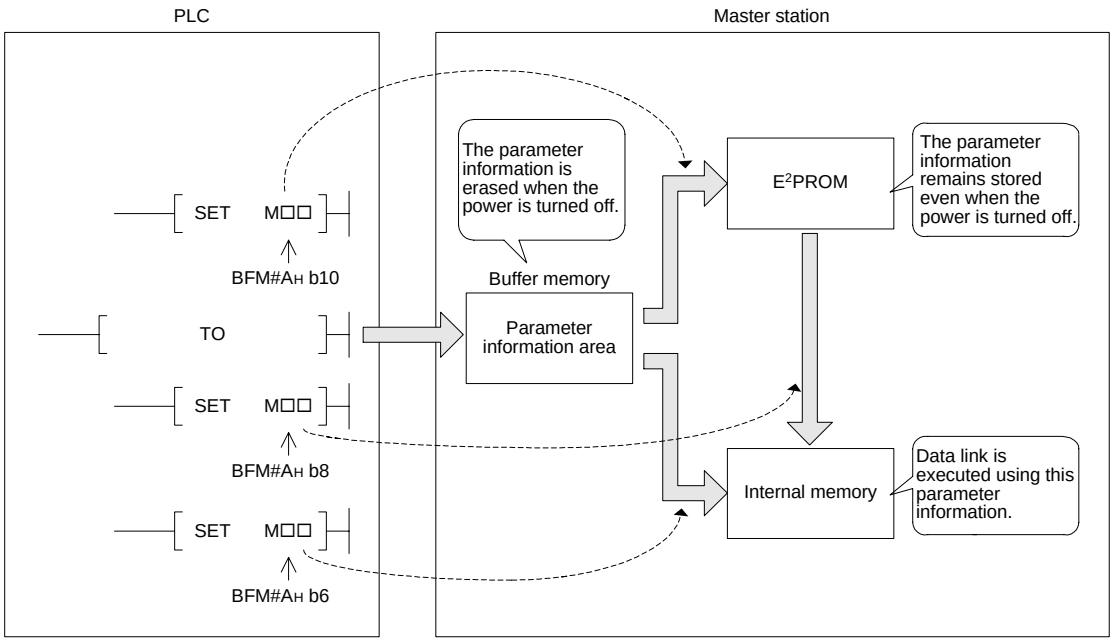
This is a temporary storage area to write the parameter information to the EEPROM or the internal memory.
When the power of the master block is turned off, the parameter information is erased.

2) EEPROM

Only by setting to ON the write request for data link startup by EEPROM parameters (BFM#AH b8), data link can be started up.
This eliminates the necessity to write parameters to the buffer memory every time the master station starts up.
However, the parameter should be registered in advance to the EEPROM by the write request for parameter registration to EEPROM (BFM#AH b10).
Even when the power of the master block is turned off, the parameter information stored in the EEPROM remains stored.
The registration limit to the EEPROM is 10,000 times.

3) Internal memory

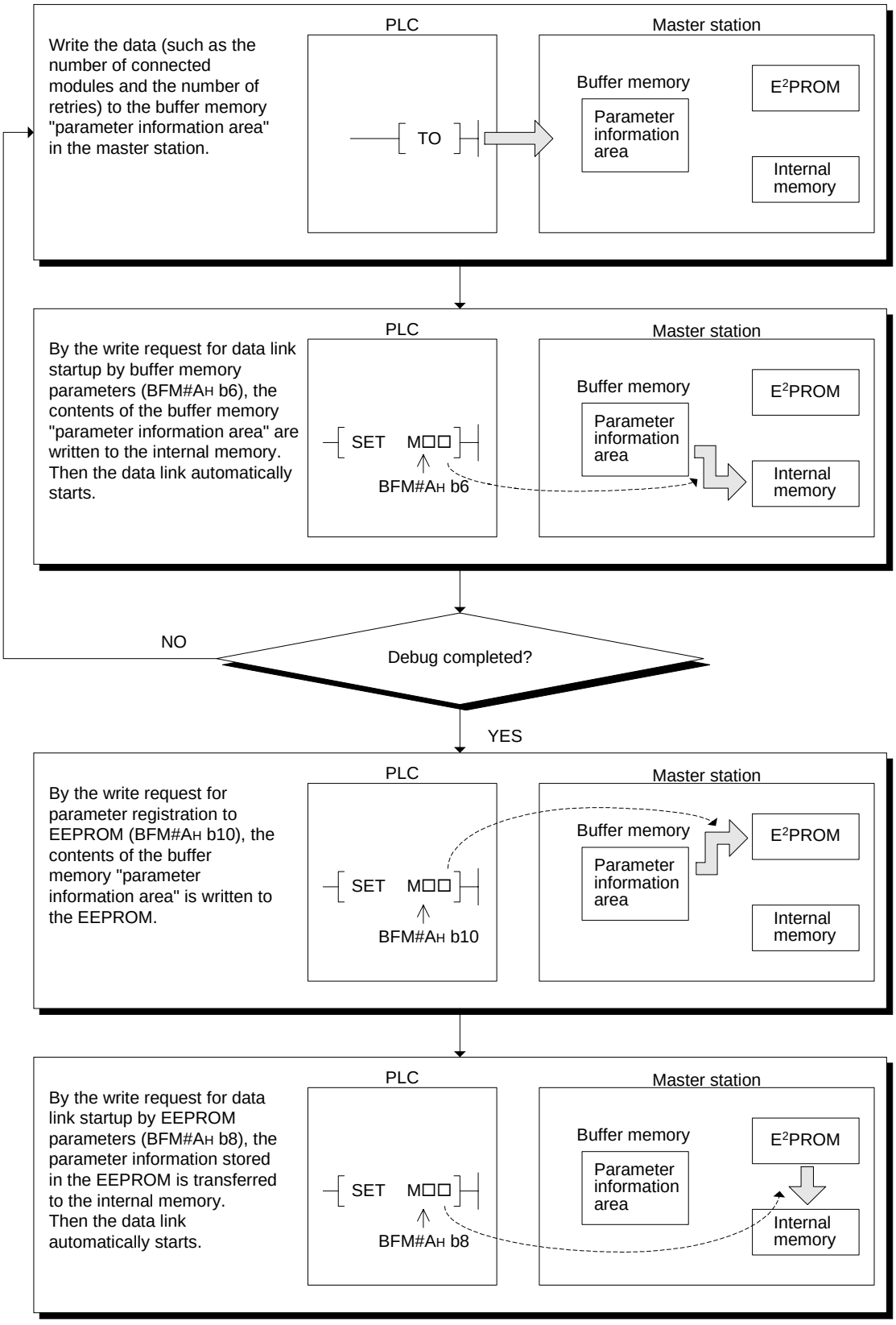
Data link is executed using the parameter information stored in the internal memory.
When the power of the master block is turned off, the parameter information is erased.



Point
It is recommended to execute "data link by buffer memory parameters" for system debug (startup), and execute "data link by EEPROM parameters" for operation after debugging.

7.1.2 Procedure from parameter setting to data link startup

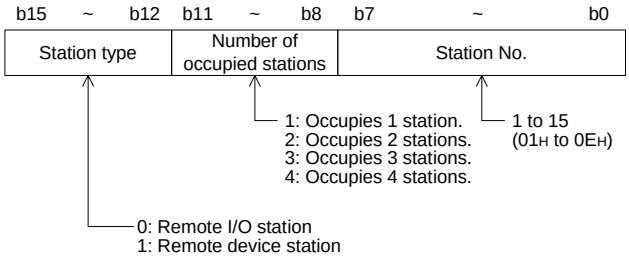
Perform the procedure shown below.



7.2 Parameter Setting Items

The table below shows the items set in the buffer memory "parameter information area" in the master station.
For details of each item, refer to Section 4.4.2.

Table 7.1:

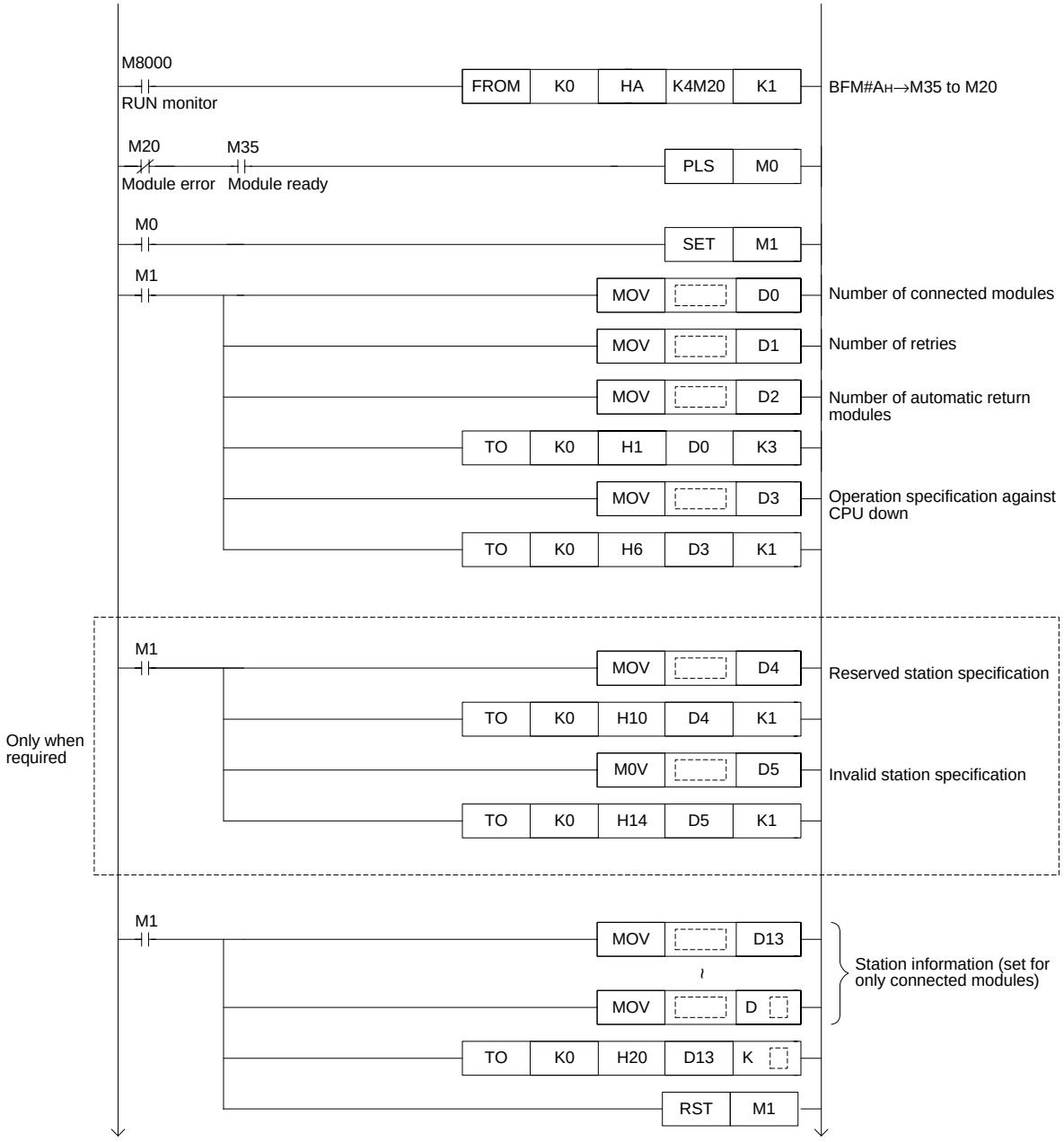
Setting item	Description	BFM# Hex.
Number of connected modules	Sets the number of remote station modules (including reserved stations) connected to the master station. Default value : 8 (modules) Setting range : 1 to 15 (modules)	1H
Number of retries	Sets the number of retries executed when communication error occurs. Default value : 3 (times) Setting range : 1 to 7 (times)	2H
Number of automatic return modules	Sets the number of remote station modules which can recover in one link scan. Default value : 1 (module) Setting range : 1 to 10 (modules)	3H
Operation specification against CPU down	Specifies the data link status when an error occurs in the master station PLC CPU. Default value : 0 (stop) Setting range : 0 (stop), 1 (continue)	6H
Reserved station specification	Specifies reserved stations. Default value : 0 (no setting) Setting range : Set to ON the bits corresponding to the station numbers	10H
Invalid station specification	Specifies invalid stations. Default value : (no setting) Setting range : Set to ON the bits corresponding to the station numbers	14H
Station information	Sets the type of connected remote station. Default value : 20H (remote I/O station, occupies 1 station, station No. 1) to 2EH (remote I/O station, occupies 1 station, station No. 15) Setting range : As shown below 	20H (1st station) to 2EH (15th station)

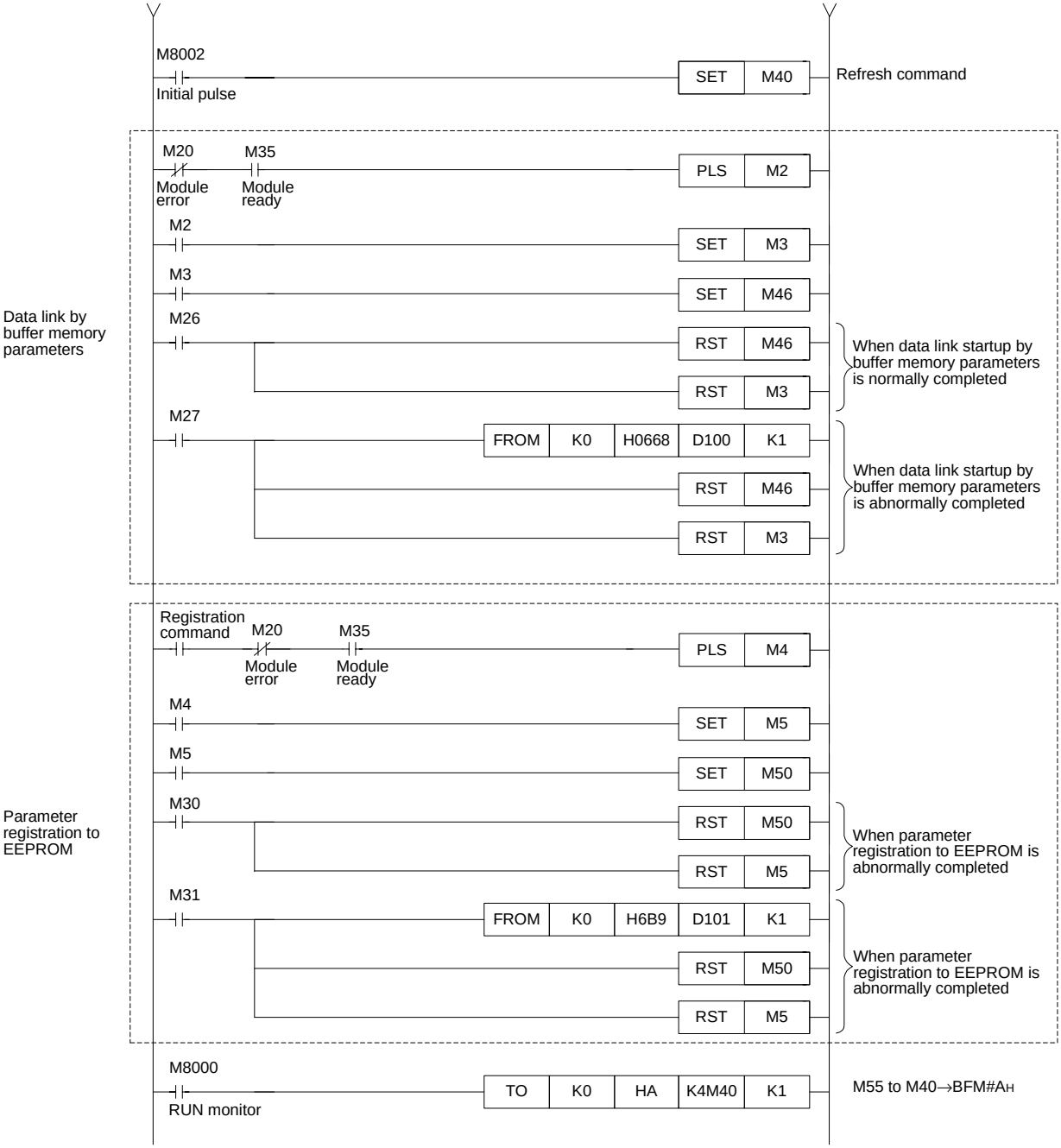
7.3 Setting from Sequence Program

This section describes the parameter setting from a sequence program.

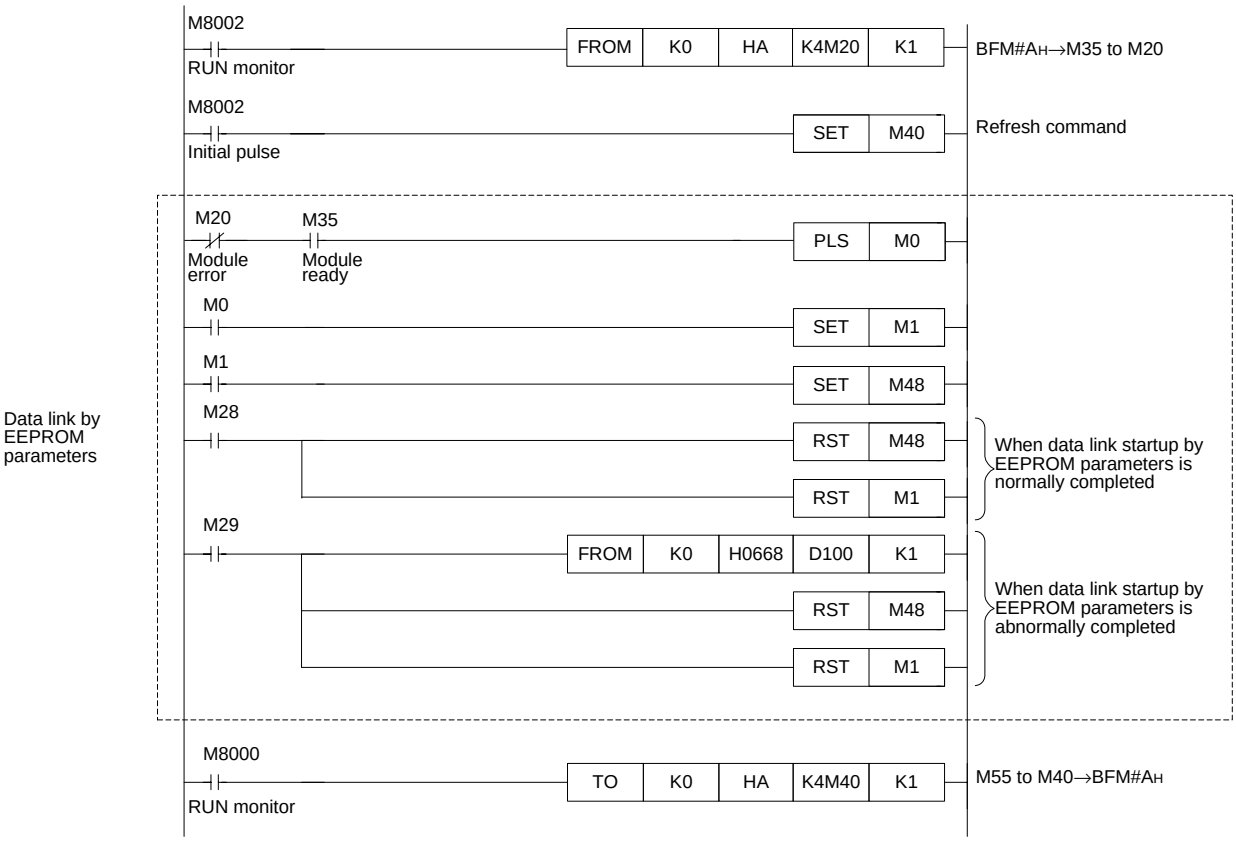
1) Overview of program

a) For debugging




M8002
Initial pulse
SET M40
Refresh command
Data link by buffer memory parameters
M20
Module error
M35
Module ready
PLS M2
M2
SET M3
M3
SET M46
M26
RST M46
RST M3
When data link startup by buffer memory parameters is normally completed
M27
FROM K0 H0668 D100 K1
RST M46
RST M3
When data link startup by buffer memory parameters is abnormally completed
Parameter registration to EEPROM
Registration command
M20
Module error
M35
Module ready
PLS M4
M4
SET M5
M5
SET M50
M30
RST M50
RST M5
When parameter registration to EEPROM is abnormally completed
M31
FROM K0 H6B9 D101 K1
RST M50
RST M5
When parameter registration to EEPROM is abnormally completed
M8000
RUN monitor
TO K0 HA K4M40 K1
M55 to M40→BFM#AH

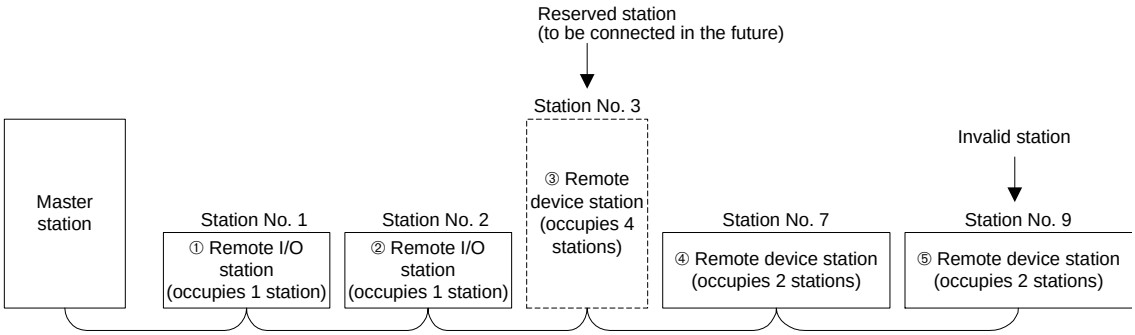
b) For operation



2) Program example

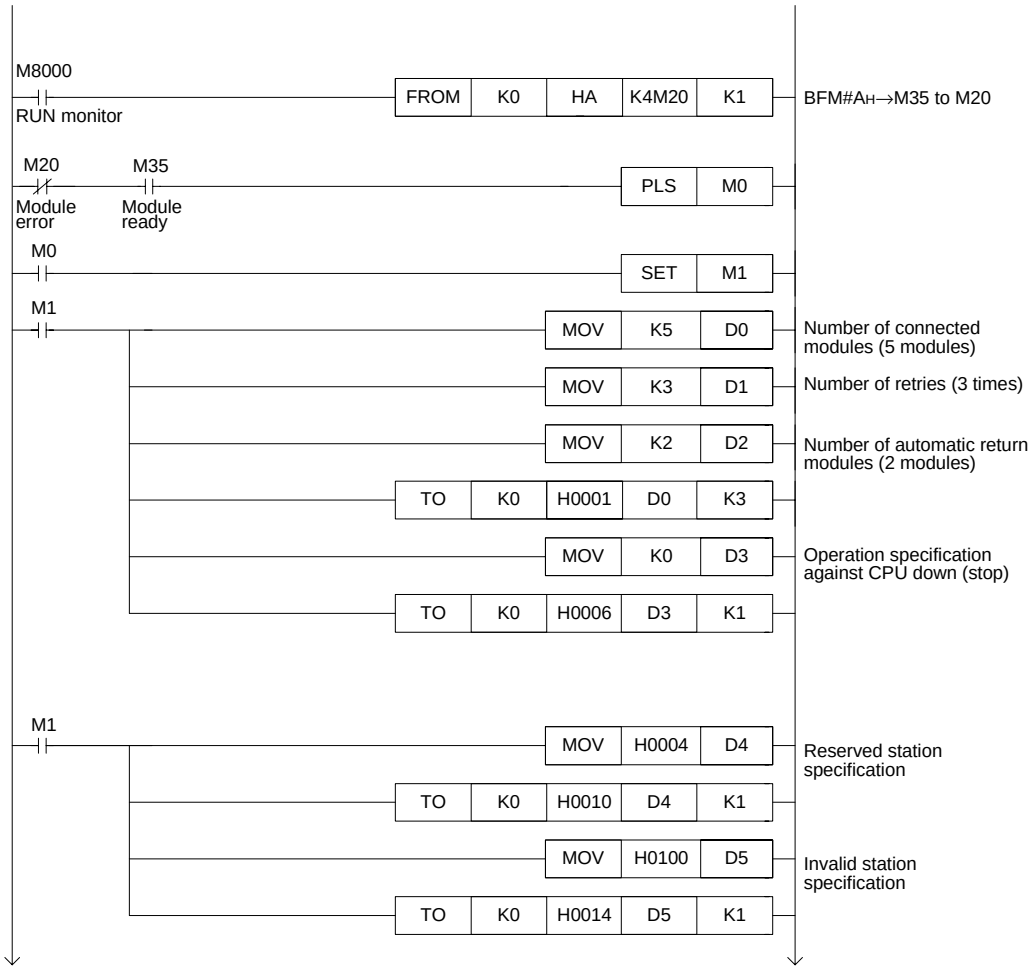
The diagram below shows an example of program for parameter setting in the system configuration shown below.

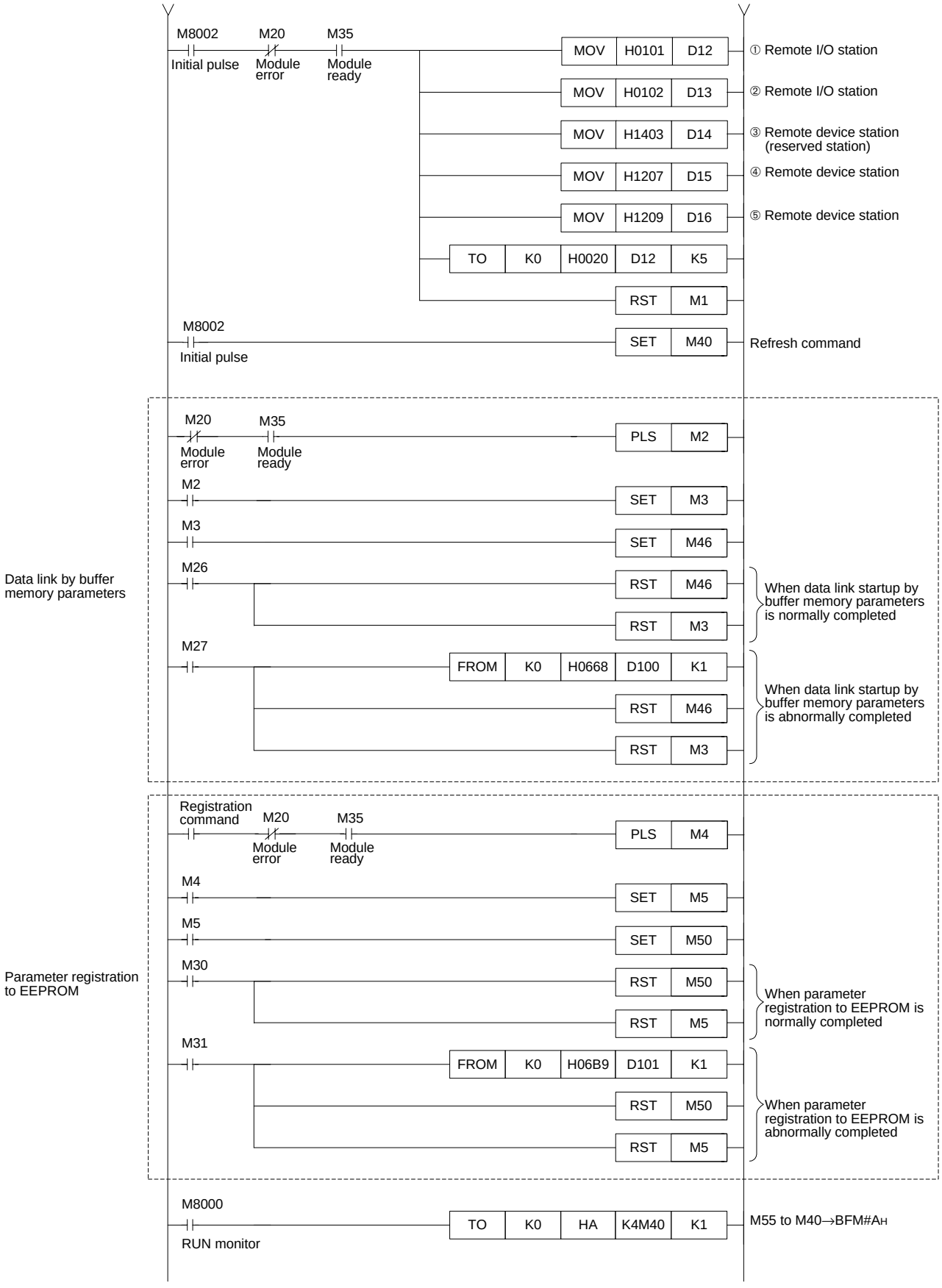
a) System configuration example



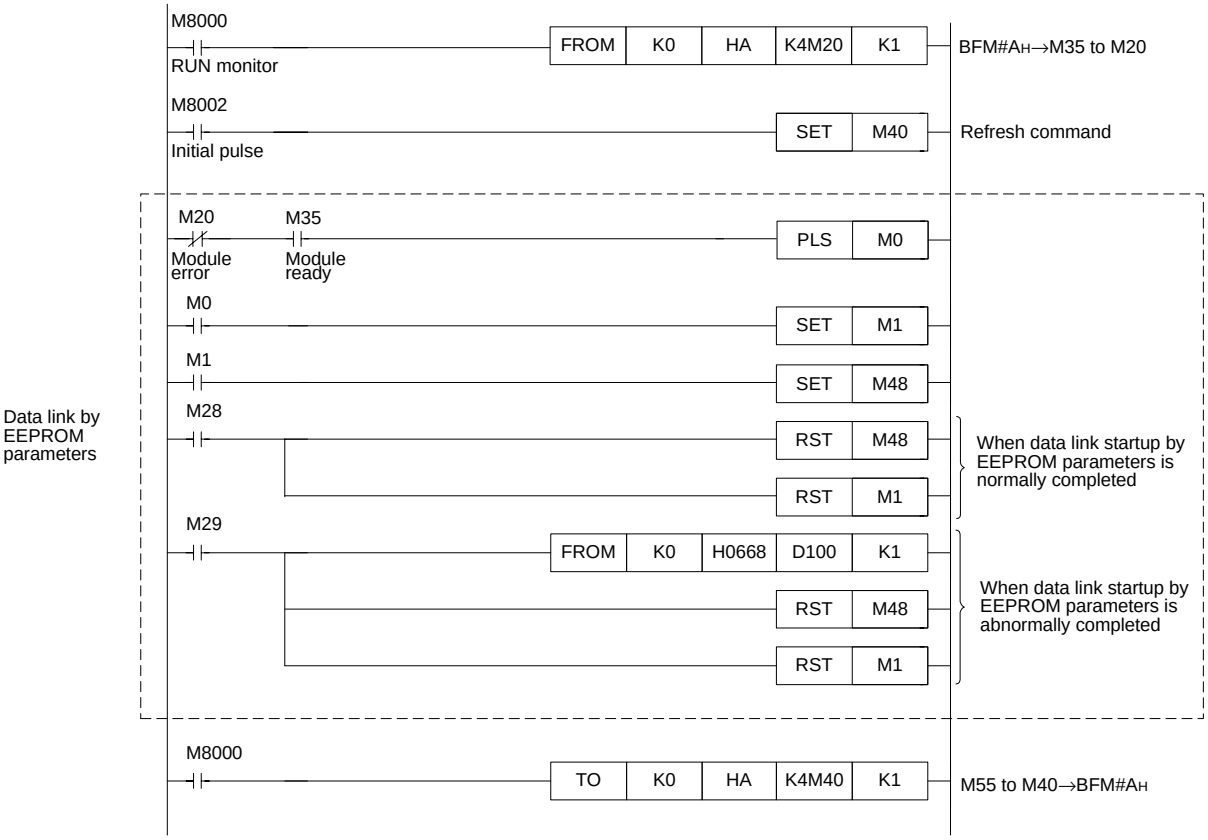
b) Program example

(1) For debugging




M8002
Initial pulse
M20
Module error
M35
Module ready
MOV H0101 D12
① Remote I/O station
MOV H0102 D13
② Remote I/O station
MOV H1403 D14
③ Remote device station (reserved station)
MOV H1207 D15
④ Remote device station
MOV H1209 D16
⑤ Remote device station
TO K0 H0020 D12 K5
RST M1
M8002
Initial pulse
SET M40
Refresh command
Data link by buffer memory parameters
M20
Module error
M35
Module ready
PLS M2
M2
SET M3
M3
SET M46
M26
RST M46
RST M3
When data link startup by buffer memory parameters is normally completed
M27
FROM K0 H0668 D100 K1
RST M46
RST M3
When data link startup by buffer memory parameters is abnormally completed
Parameter registration to EEPROM
Registration command
M20
Module error
M35
Module ready
PLS M4
M4
SET M5
M5
SET M50
M30
RST M50
RST M5
When parameter registration to EEPROM is normally completed
M31
FROM K0 H06B9 D101 K1
RST M50
RST M5
When parameter registration to EEPROM is abnormally completed
M8000
RUN monitor
TO K0 HA K4M40 K1
M55 to M40→BFM#AH

(2) For operation



8. Data Link Procedure

INSTALLATION PRECAUTIONS

- Use the module in the environment for the general specification described in Chapter 4 of this manual.
  Do not use the PLC in a place with dust, soot, conductive dust, corrosive gas or combustible gas, place exposed to high temperature, condensation, wind or rain or place with vibration or impact.
  Using the module outside the range of the general specification or in a place above may result in electrical shock, fire, malfunctions, or may damage the PLC.

- When drilling screw holes or performing wiring, make sure that cutting chips, wire chips or other foreign matter does not enter the ventilation window of the module.
  Such matter may cause fire, failure or malfunction.

- When the installation work is completed, remove the dust protection sheet from the ventilation window of the PLC.
  If the sheet remains attached, it may cause fire, failure or malfunction.

- Securely connect extension cables to specified connectors.
  Poor contact may cause malfunction.

WIRING PRECAUTIONS

- Before beginning any installation or wiring work, make sure all phases of the power supply have been shut down from the outside.
  Incomplete shutdown of the power supply phases may cause electrical shock or damage in the module.

- Following an installation or wiring work, when turning on the power supply and operating the PLC, make sure that the terminal cover provided as an accessory has been attached to the module.
  Non-attachment of the cover may cause electrical shock.

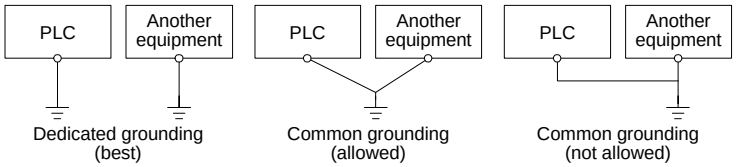
- For the CC-Link system, use dedicated cables specified by the manufacturer.
  The performance of the CC-Link system cannot be guaranteed with any cable other than dedicated ones specified by the manufacturer.
  For the maximum total extension length and the cable length between stations, observe the specification described in Chapter 4.
  With wiring outside the specification range, normal data transfer cannot be guaranteed.

- Make sure to fix communication cables and power cables connected to the module by placing them in the duct or clamping them.
  Cables not placed in duct or not clamped may hang or shift, allowing them to be accidentally pulled, which may result in malfunction or damage to the module and the cables.

- When disconnecting a communication/power cable connected to the module, do not hold the cable area.
  For a cable with connector, hold the connector attached to the module.
  For a cable connected to a terminal block, loosen screws of the terminal block, then disconnect the cable.
  If a cable is pulled while it is connected to a module, the module may malfunction or the module and the cable may be damaged.

WIRING PRECAUTIONS

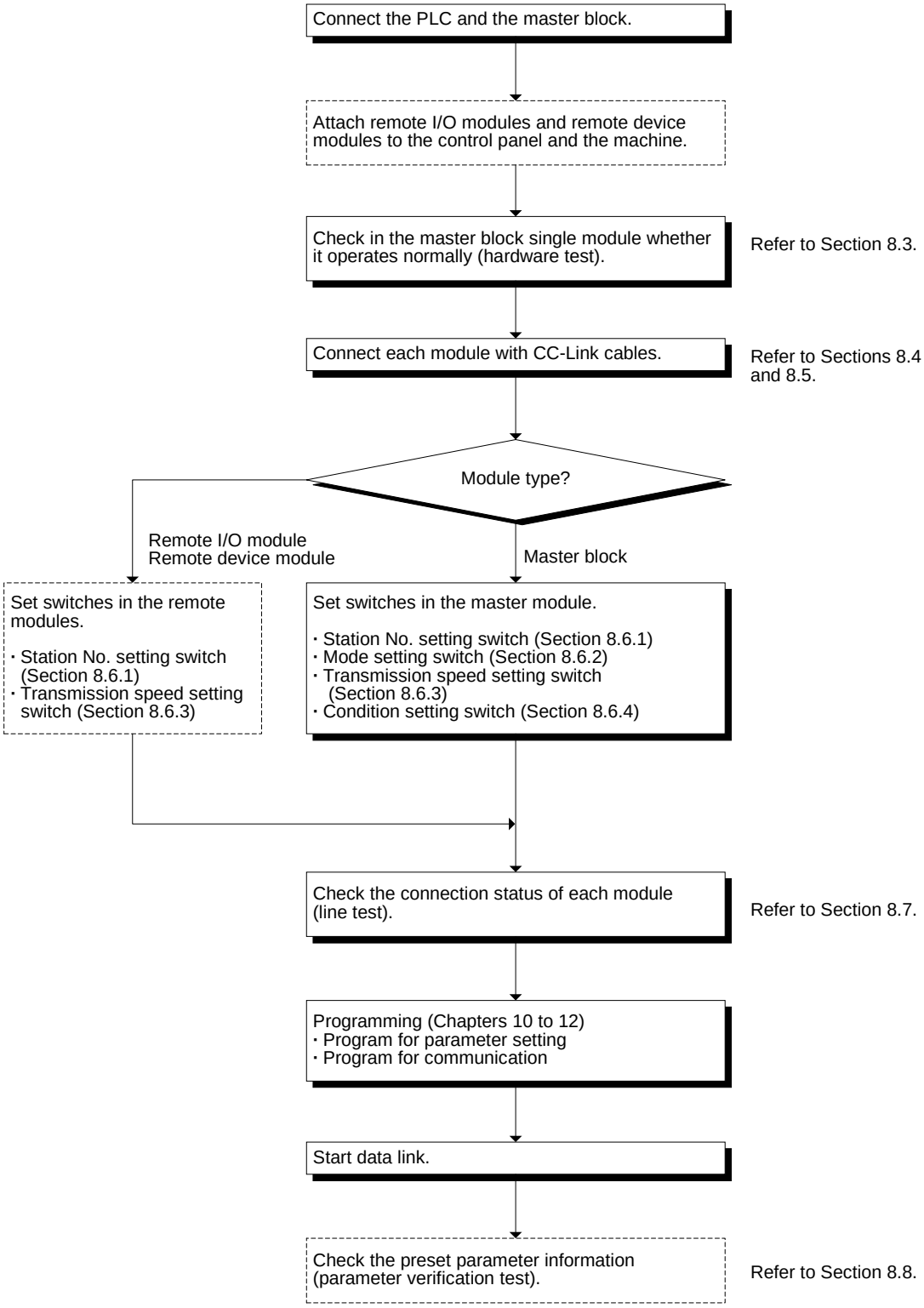
- Perform Class D grounding (solid grounding) with a wire of 2 mm^2 or more to the grounding terminal in the PLC main unit. However, never perform common grounding with a high voltage system.



- Do not bundle control cables and communication cables with the main circuit and power cables. Keep control cables and communication cables at least 100 mm away from the main circuit and power cables.
  Otherwise, electric noise may cause a malfunction.

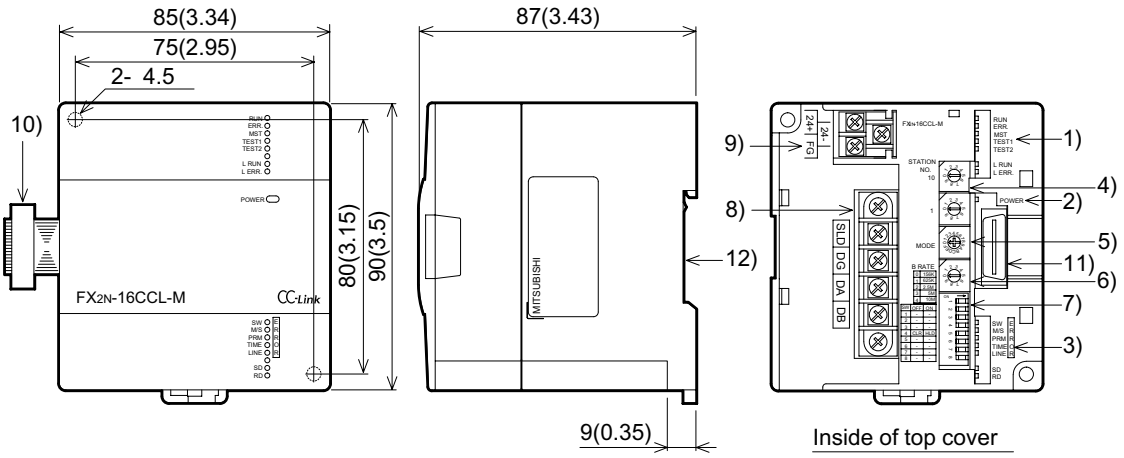
8.1 Data Link Procedure

The flowchart below shows the procedure for data link in the CC-Link system.



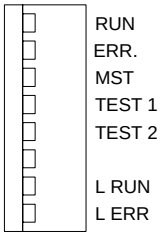
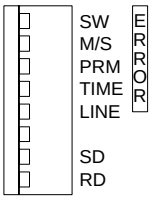
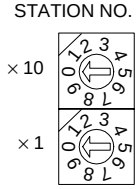
8.2 Name of Each Part and Settings

This section describes the name of each part of the master block, the contents indicated by the LED indicators and the setting method of each switch.



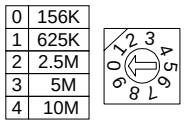
Dimensions: mm (inches)

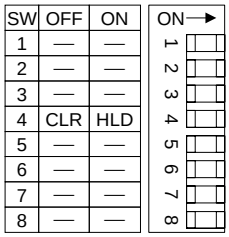
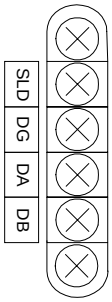
Table 8.1:

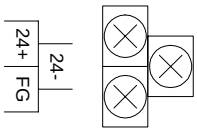
Number	Name	Description				
1)	LED indicators 1  	LED name		Description	LED status	
					Normal	Error
		RUN		ON : Module is normal. OFF : Watchdog time error has occurred.	ON	OFF
		ERR.		Indicates the communication status with the stations set in parameter. ON : Communication error has occurred in all stations. Flashing : Communication error has occurred in some stations.	OFF	ON or flashing
		MST		ON : Set as the master station	ON	OFF
		TEST1		Test result indication	OFF except during test	
		TEST2		Test result indication		
		L RUN		ON : Data link is being executed (host station).	ON	OFF
		L ERR.		ON : Communication error has occurred (host station). Flashing : The settings of the switches (4) to (7) are changed while the power is ON.	OFF	ON or flashing
2)	Power indictor	POWER		ON : 24V DC is supplied from the outside.	ON	OFF
3)	LED indicators 2  	ERROR	SW	ON : Switch setting error has occurred.	OFF	ON
			M/S	ON : The master station is already present in the same line.	OFF	ON
			PRM	ON : Parameter setting error has occurred.	OFF	ON
			TIME	ON : Data link watchdog timer is actuated (error in all stations).	OFF	ON
			LINE	ON : The cable is broken or the transmission route is affected by noise, etc.	OFF	ON
		SD		ON : Data is being transmitted.	ON	OFF
		RD		ON : Data is being received.	ON	OFF
4)	Station number setting switch  	Sets the station number of the module. (Default setting at shipment: 00) <Setting range> 00 (because the FX2N-16CCL-M is dedicated to the master station) If "65" or larger number is set, the "SW" and "L ERR." LED indicators turn ON.				

<table>
<tr><th>Number</th><th>Name</th><th colspan="3">Description</th></tr>
<tr><td rowspan="18">5)</td><td rowspan="18">Mode setting switch

MODE
 </td><td colspan="3">Sets the operation status of the module. (Default setting at shipment: 0)</td></tr>
<tr><td>Number</td><td>Name</td><td>Description</td></tr>
<tr><td>0</td><td>Online</td><td>Sets connection to data link.</td></tr>
<tr><td>1</td><td>(Unusable)</td><td>—</td></tr>
<tr><td>2</td><td>Offline</td><td>Sets disconnection from data link.</td></tr>
<tr><td>3</td><td>Line test 1</td><td>Refer to Section 8.7.1.</td></tr>
<tr><td>4</td><td>Line test 2</td><td>Refer to Section 8.7.2.</td></tr>
<tr><td>5</td><td>Parameter verification test</td><td>Refer to Section 8.8.</td></tr>
<tr><td>6</td><td>Hardware test</td><td>Refer to Section 8.3.</td></tr>
<tr><td>7</td><td>(Unusable)</td><td>Setting error (The SW LED indicator turns ON.)</td></tr>
<tr><td>8</td><td>(Unusable)</td><td>Cannot be set because it is already used inside.</td></tr>
<tr><td>9</td><td>(Unusable)</td><td>Cannot be set because it is already used inside.</td></tr>
<tr><td>A</td><td>(Unusable)</td><td>Cannot be set because it is already used inside.</td></tr>
<tr><td>B</td><td>(Unusable)</td><td>Setting error (The SW LED indicator turns ON.)</td></tr>
<tr><td>C</td><td>(Unusable)</td><td>Setting error (The SW LED indicator turns ON.)</td></tr>
<tr><td>D</td><td>(Unusable)</td><td>Setting error (The SW LED indicator turns ON.)</td></tr>
<tr><td>E</td><td>(Unusable)</td><td>Setting error (The SW LED indicator turns ON.)</td></tr>
<tr><td>F</td><td>(Unusable)</td><td>Setting error (The SW LED indicator turns ON.)</td></tr>
<tr><td rowspan="16">6)</td><td rowspan="16">Transmission speed setting switch

B RATE
  </td><td colspan="3">Sets the transmission speed of the module. (Default setting at shipment: 0)</td></tr>
<tr><td>Number</td><td colspan="2">Setting contents</td></tr>
<tr><td>0</td><td colspan="2">156kbps</td></tr>
<tr><td>1</td><td colspan="2">625kbps</td></tr>
<tr><td>2</td><td colspan="2">2.5Mbps</td></tr>
<tr><td>3</td><td colspan="2">5Mbps</td></tr>
<tr><td>4</td><td colspan="2">10Mbps</td></tr>
<tr><td>5</td><td colspan="2">Setting error (The SW and L ERR. LED indicators turn ON.)</td></tr>
<tr><td>6</td><td colspan="2">Setting error (The SW and L ERR. LED indicators turn ON.)</td></tr>
<tr><td>7</td><td colspan="2">Setting error (The SW and L ERR. LED indicators turn ON.)</td></tr>
<tr><td>8</td><td colspan="2">Setting error (The SW and L ERR. LED indicators turn ON.)</td></tr>
<tr><td>9</td><td colspan="2">Setting error (The SW and L ERR. LED indicators turn ON.)</td></tr>
</table>

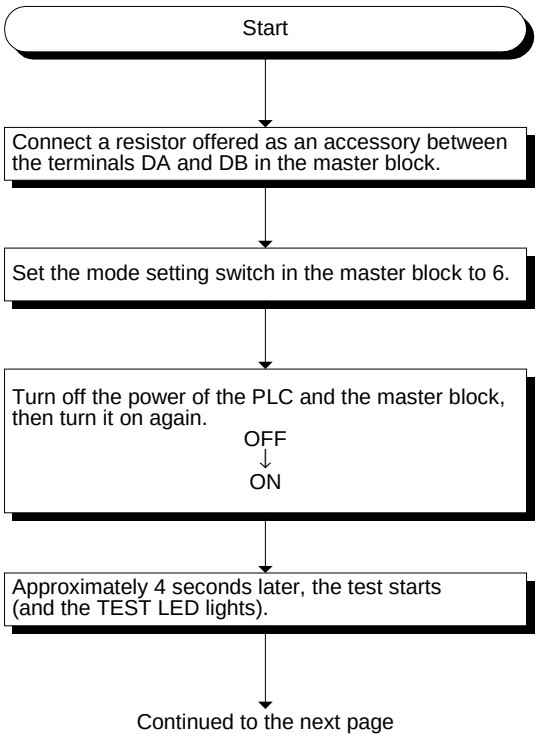
<table>
<tr><th>Number</th><th>Name</th><th colspan="4">Description</th></tr>
<tr><td>7)</td><td>Condition setting switch
 
</td><td colspan="4">Sets the operation condition. (Default setting at shipment: All OFF)
<table>
<tr><td>Number</td><td>Setting description</td><td colspan="2">Switch status</td></tr>
<tr><td></td><td></td><td>ON</td><td>OFF</td></tr>
<tr><td>SW1</td><td>(Unusable)</td><td colspan="2">Always OFF</td></tr>
<tr><td>SW2</td><td>(Unusable)</td><td colspan="2">Always OFF</td></tr>
<tr><td>SW3</td><td>(Unusable)</td><td colspan="2">Always OFF</td></tr>
<tr><td>SW4</td><td>Input data status in data link faulty station</td><td>Keep (HLD)</td><td>Clear (CLR)</td></tr>
<tr><td>SW5</td><td>(Unusable)</td><td colspan="2">Always OFF</td></tr>
<tr><td>SW6</td><td>(Unusable)</td><td colspan="2">Always OFF</td></tr>
<tr><td>SW7</td><td>(Unusable)</td><td colspan="2">Always OFF</td></tr>
<tr><td>SW8</td><td>(Unusable)</td><td colspan="2">Always OFF</td></tr>
</table></td></tr>
<tr><td>8)</td><td>Terminal block
 
</td><td colspan="4">Connects dedicated CC-Link cables to enable data link.
For the connection method, refer to Section 8.4.

The terminals SLD and FG are connected inside.</td></tr>
<tr><td>9)</td><td>Terminal block
 
</td><td colspan="4">Connects the power supply to operate the master block.</td></tr>
<tr><td>10)</td><td>Extension cable</td><td colspan="4">Connects the PLC.</td></tr>
<tr><td>11)</td><td>Next step extension connector</td><td colspan="4">Connects an extension equipment.</td></tr>
<tr><td>12)</td><td>DIN rail mounting groove</td><td colspan="4">DIN46277: DIN rail mounting groove of 35 mm (1.38") in width</td></tr>
</table>

8.3 Master Block Status Check (Hardware Test)

Check in the master block single module whether it operates normally.
Make sure to execute this hardware test before constructing the system.

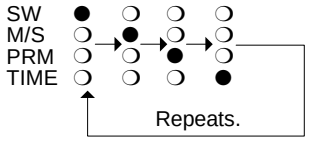
Execute the test using the following procedure.



Continued from the previous page

The test result is indicated by the LED indicators in the master module.

[When normal]
The LED indicators turn ON in the order "SW → M/S → PRM → TIME".



[When abnormal]
The table below shows the contents of each check item.
If an error occurs, replace the module.

Check item	LED status	Description
Self-loop back check	SW is ON.	Module error
ROM check	M/S is ON.	ROM error
RAM check	PRM is ON.	RAM error

The RUN LED turns OFF.

End

8.4 Module Wiring with Dedicated CC-Link Cables

This section describes the connection method of dedicated CC-Link cables.

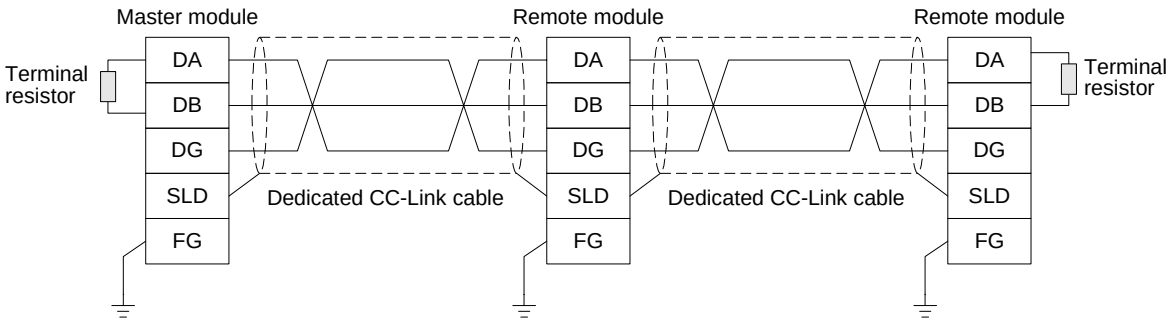
- The cables can be connected without regard to the station number.
- Make sure to connect a terminal resistor (offered as an accessory of the module) between the terminals DA and DB in modules at both ends.
- In the CC-Link system, the terminal resistor to be connected varies depending on the used cable.
  - When a dedicated CC-Link cable is used: 110 Ω, 1/2 W (brown, brown and brown)
  - When a dedicated high-performance CC-Link cable is used: 130 Ω, 1/2 W (brown, orange and brown)
- The master module can be connected besides to the both ends.
- Star connection is not allowed.
- The figure below shows the connection method.

Important

Make sure to use only one type of cable (dedicated CC-Link cables OR dedicated CC-Link high-performance cables).
If both types of cables are used together, normal data transmission cannot be guaranteed.

Point

The shielded dedicated CC-Link cable should go through the terminals SLD and FG in each module, and both ends should be grounded (Class D = solid grounding).
The terminals SLD and FG are connected each other inside the module.

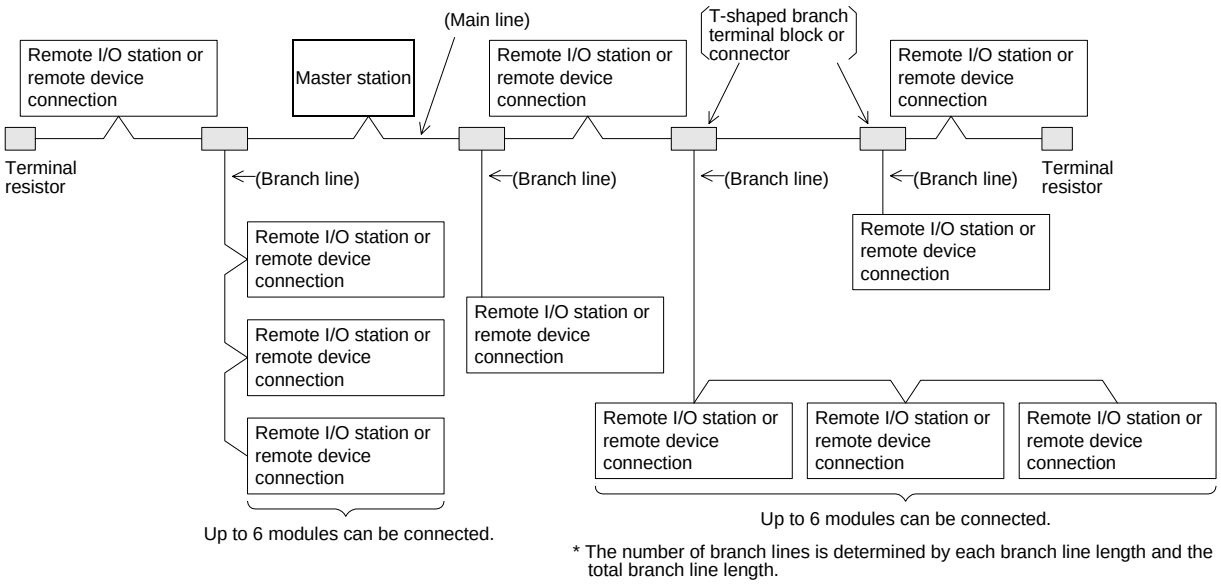


8.5 T-shaped Branch Connection Using Dedicated CC-Link Cables

This section describes the T-shaped branch connection using dedicated CC-Link cables.

8.5.1 System configuration with T-shaped branch connection

The figure below shows the system configuration with T-shaped branch connection.



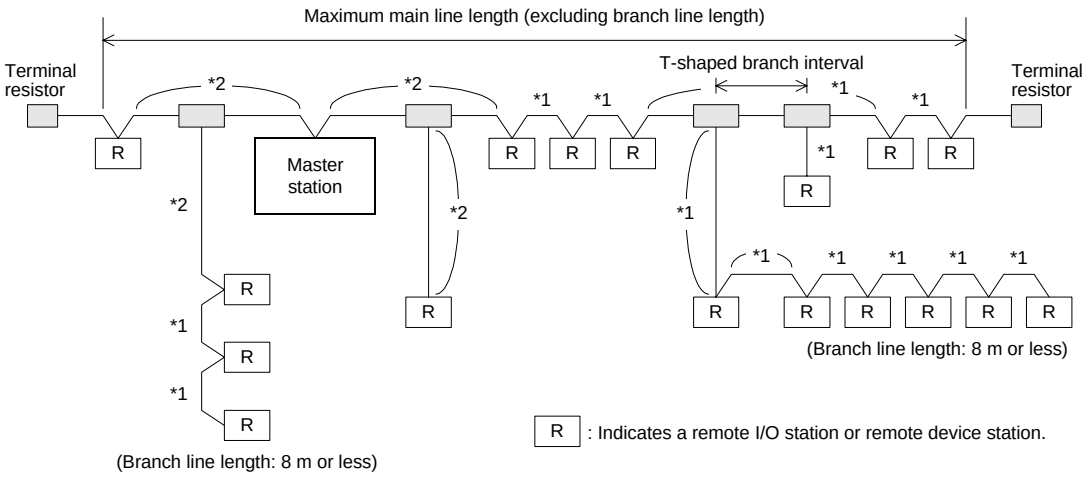
* The number of branch lines is determined by each branch line length and the total branch line length.

8.5.2 T-shaped branch communication specification list

The table below shows the communication specification in T-shaped branch connection. For communication specification not shown in the table below, refer to Section 4.2.

Table 8.2:

<table>
<tr><th>Item</th><th colspan="2">Specification</th><th>Remarks</th></tr>
<tr><td>Transmission speed</td><td>625kbps</td><td>156kbps</td><td>10, 5 and 2.5 Mbps are not available.</td></tr>
<tr><td>Maximum main line length</td><td>100m</td><td>500m</td><td>The value indicates the cable length between terminal resistors.
The cable length of T-shaped branch lines (branch length) is not included.</td></tr>
<tr><td>Maximum branch line length</td><td colspan="2">8m</td><td>The value indicates the cable length per branch line.</td></tr>
<tr><td>Total branch line length</td><td>50m</td><td>200m</td><td>The value indicates the total length of all branch lines.</td></tr>
<tr><td>Maximum number of modules connected to branch line</td><td colspan="2">6 modules/branch line</td><td>The number of connected modules conforms to the CC-Link specification.</td></tr>
<tr><td>Connection cable</td><td colspan="2">Dedicated CC-Link cable
(Examples: FANC-SB, CSFV-SLAB, 100ZCLK-SB-20AWGX3C)</td><td>• Dedicated high-performance CC-Link cables (example: FANC-SBH) are not available.
• Cables produced by different manufacturers are not available at the same time.
(For manufacturers, refer to brochures.)</td></tr>
<tr><td>Terminal resistor (connection method)</td><td colspan="2">Connect a resistor (110 Ω) packed together with master module.</td><td>For the connection method, refer to Section 8.4.</td></tr>
<tr><td>T-shaped branch terminal block/ connector</td><td colspan="2">• Terminal block: Commercial one
• Connector:
Connector for FA sensor NECA4202 (IEC947-5-2) or its equivalent is recommended.
(NECA: THE JAPAN ELECTRIC CONTROL EQUIPMENT INDUSTRY ASSOCIATION Standards)</td><td>• When wiring cables to the main line, strip as little of the insulation as possible.</td></tr>
<tr><td>Maximum main line length, T-shaped branch interval and cable length between modules</td><td colspan="3">Dedicated CC-Link cable (with terminal resistor of 110 Ω)
<table>
<tr><th>Transmission speed</th><th>Maximum main line length</th><th>T-shaped branch interval</th><th>Cable length between remote stations*1</th><th>Cable length between master station and adjacent station*2</th></tr>
<tr><td>625kbps</td><td>100m</td><td rowspan="2">No limit</td><td rowspan="2">30 cm or more</td><td rowspan="2">1 m or more</td></tr>
<tr><td>156kbps</td><td>500m</td></tr>
</table></td></tr>
</table>



8.6 Switch Settings

This section describes the setting method of each switch in the modules.

8.6.1 Station number setting (master station, remote I/O stations and remote device stations)

This section describes the method to set the station number of the master station, remote I/O stations and remote device stations.

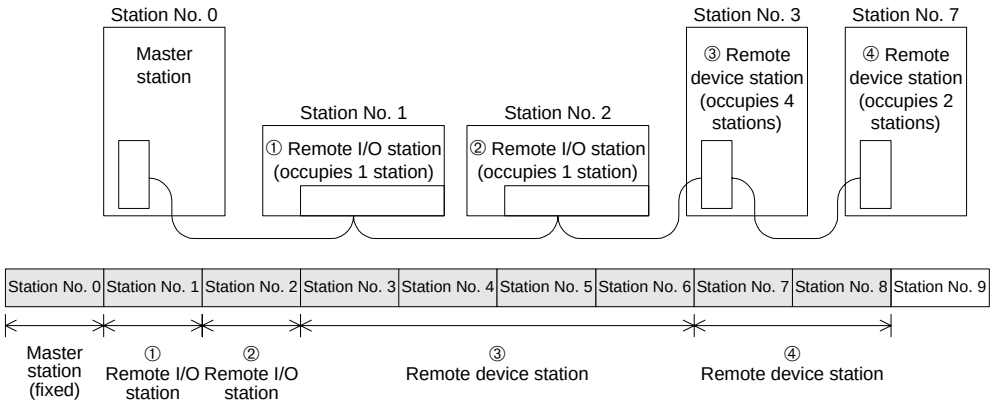
> **Point**
>
> Align the settings with the contents stored in the parameter information area "station information (addresses 20H to 2EH)" in the buffer memory.

1) Set the station numbers to be consecutive.
   The station number can be set without regard to the connection order.
   For a module occupying 2 or more stations, set the head station number.

Table 8.3:

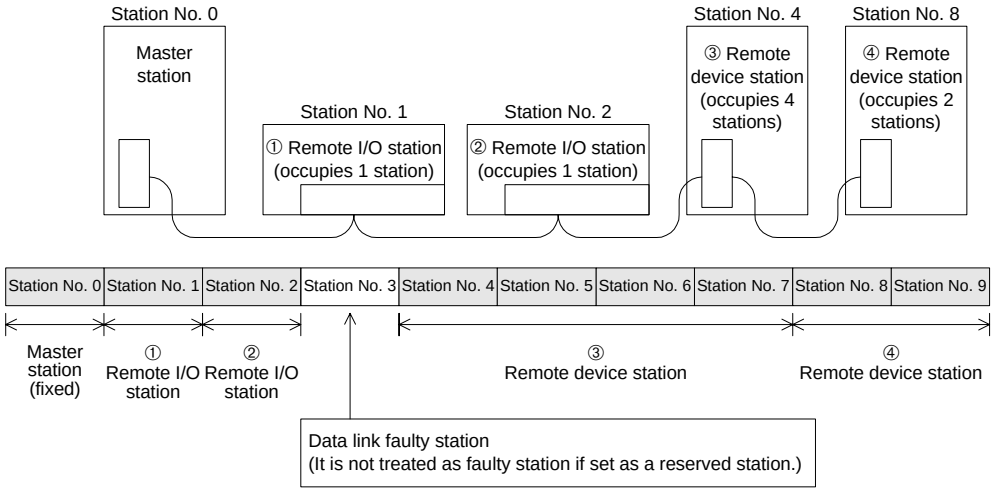
Station type	Station number to be set
Master station	0 (fixed)
Remote I/O station Remote device station	1 to 15

Setting example: When setting the station numbers in the connection order



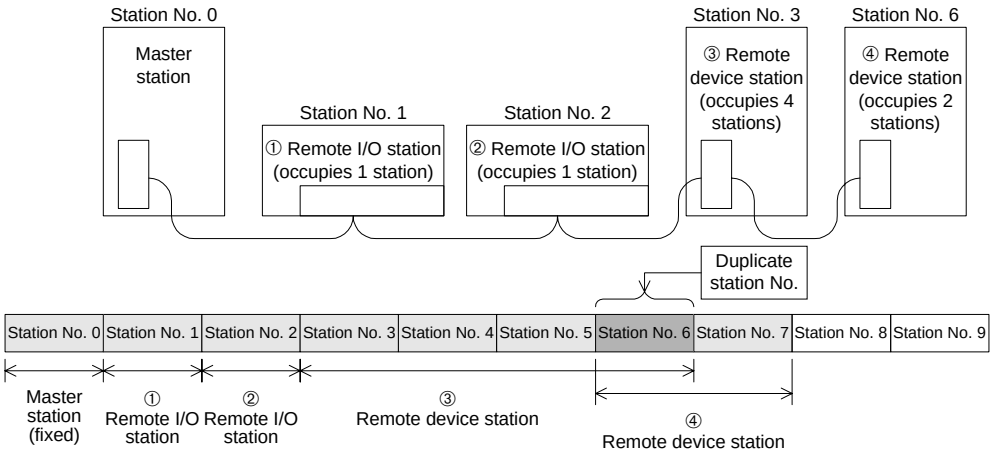
2) Do not skip station numbers
The skipped station numbers are treated as "data link faulty stations" (which can be checked in the link special register SW0080 or the buffer memory address 680H). However, by setting such stations as reserved they are not treated as data link faulty stations.

Setting example 1: When one station number is skipped



3) Duplicate station numbers are not allowed.
If there are duplicate numbers, a loading status error occurs. (The error code is stored in SW0069.)

Setting example: When one station number is duplicated



8.6.2 Mode setting

When executing the data link, the normal setting is "0(online)".

8.6.3 Transmission speed setting

The available transmission speed varies depending on the total extension distance.
For the details, refer to Section 4.2.1.

> **Point**
>
> Set the same transmission speed to all of the master station and remote stations.
> If the setting is different even in one station, normal data link cannot be realized.

8.6.4 Condition setting

The table below shows the setting method of the condition setting switch (DIP switch).

Table 8.4:

Number	Description	Switch status		Setting	
		OFF	ON		
SW1	(Unusable)	—		Always OFF	
SW2	(Unusable)	—		Always OFF	
SW3	(Unusable)	—		Always OFF	
SW4	Input data status of data link faulty station (Section 5.8)	Clear	Keep	OFF	Sets to OFF all of the input data from data link faulty station.
				ON	Keeps the input data from data link faulty station in the status just before error.
SW5	(Unusable)	—		Always OFF	
SW6	(Unusable)	—		Always OFF	
SW7	(Unusable)	—		Always OFF	
SW8	(Unusable)	—		Always OFF	

8.7 Connection Status Check (Line Test)

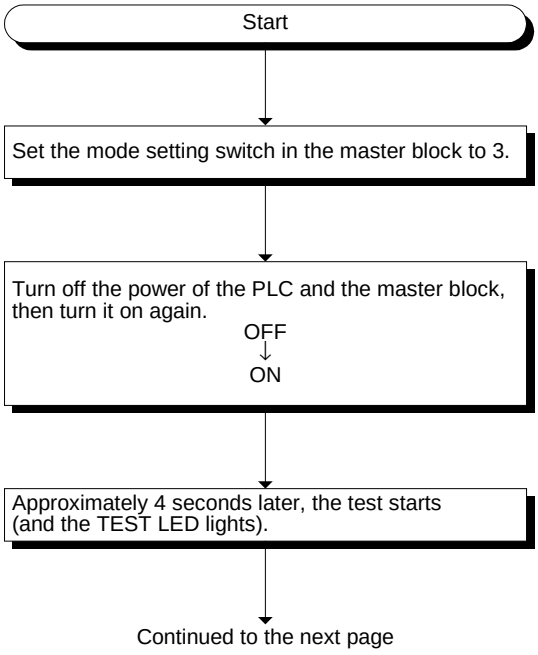
After connecting all modules with dedicated CC-Link cables, execute the line test to check whether connection is correctly established to execute data link with remote stations.

Point
Execute line test 2 when an error occurs in line test 1. Accordingly, when no error is detected in the line test 1, there is no necessity to execute line test 2.

8.7.1 Check of connection status and communication status with remote stations (line test 1)

Check whether data link can be normally executed with all (16) remote stations.

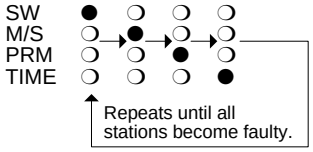
Execute the test using the following procedure.



Continued from the previous page

The test result is indicated by the LED indicators in the master block.

[When communication is normal in at least one station]
The LED indicators turn ON in the order "SW → M/S → PRM → TIME".
The test result is stored in SW00B4.
However, because the test is executed to 16 stations, ignore the bits corresponding to unconnected stations.



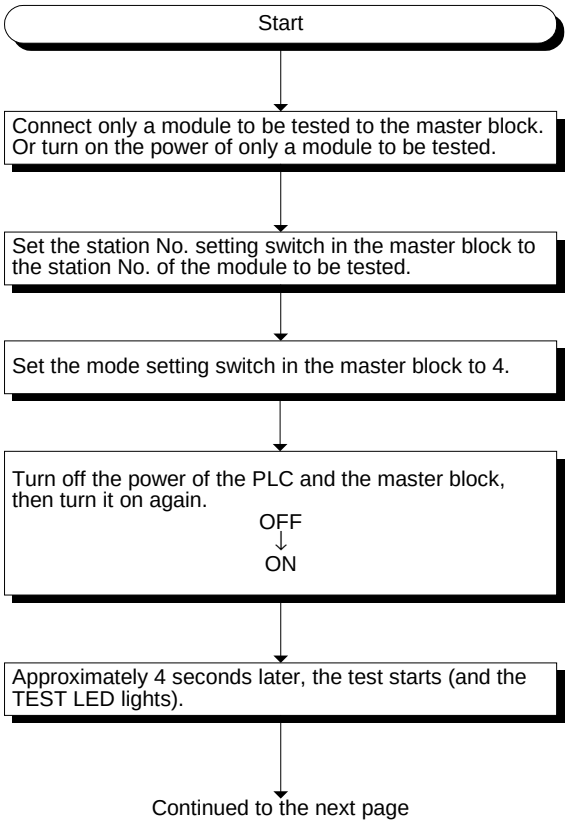
Lighting LED	Cause	Error code storage area
PRM	All stations are faulty or cable is broken.	SW00B8
None	Test cannot start (due to abnormality in hardware, power OFF in all stations, etc.).	—

End

8.7.2 Check of communication status with specific remote station (line test 2)

Execute the line test 2 to check whether data link is normally executed with a specific remote station.
There is no need to set parameters.

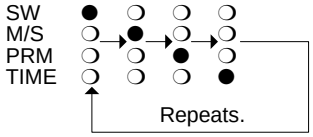
Execute the test using the following procedure.



Continued from the previous page

The test result is indicated by the LED indicators in the master block.

[When normal]
The LED indicators turn ON in the order "SW → M/S → PRM → TIME".
It is judged as normal when this repeats five times or more.



[When abnormal]

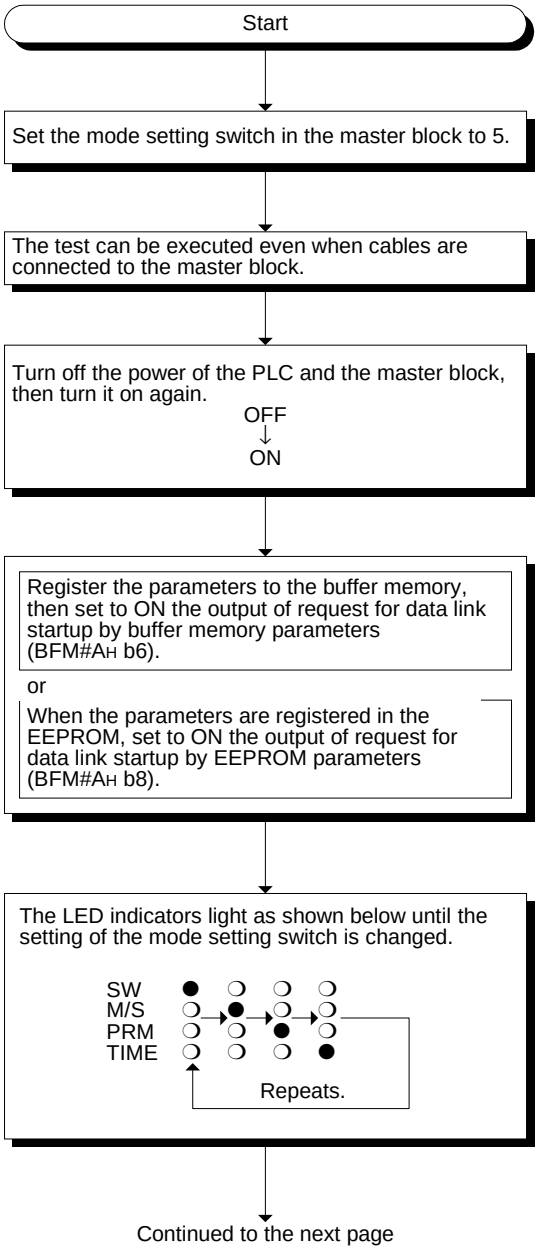
Lighting LED	Cause	Error code storage area
PRM	・Cable is broken or the corresponding station has error. ・Test transmission text is corrupt.	SW00B8
None	Test cannot start (due to abnormality in hardware or power OFF in all stations).	—

End

8.8 Parameter Check (Parameter Verification Test)

The contents of the parameters can be verified.

Execute the test using the following procedure.



Continued from the previous page

The test result is indicated by the LED indicators in the master module.
By changing over the setting of the mode setting switch, the contents of the parameter corresponding to each mode number are indicated by the LED indicators.

Mode setting switch	Parameter item	Used LED indicators and contents
0	Total number of stations	10's digit : MST, TEST1, TEST2 1's digit : SW, M/S, PRM, TIME
1	Number of connected modules	
2	Number of retries	MST ❍ ……40 → MST ❍ TEST1❍ ……20 → TEST1 ● TEST2❍ ……10 → TEST2 ❍ In the case of 26 SW ❍ ……8 → SW ❍ M/S ❍ ……4 → M/S ● PRM ❍ ……2 → PRM ● TIME ❍ ……1 → TIME ❍
3	(Unusable)	
4	Reserved station specification	SW (OFF: No specification, ON: Specification given)
5	Invalid station specification	SW (OFF: No specification, ON: Specification given)
6	Station type *2	SW : Remote I/O station M/S : Remote device station
7	Number of occupied stations *2	SW : 1 station M/S : 2 stations PRM : 3 stations TIME : 4 stations
8	Station number *1	10's digit : MST, TEST1, TEST2 1's digit : SW, M/S, PRM, TIME MST ❍ ……40 → MST ❍ TEST1❍ ……20 → TEST1 ● TEST2❍ ……10 → TEST2 ❍ In the case of 26 SW ❍ ……8 → SW ❍ M/S ❍ ……4 → M/S ● PRM ❍ ……2 → PRM ● TIME ❍ ……1 → TIME ❍
9 to F	(Unusable)	

*1 Set the station number of the module using the station number setting switch.
*2 For a module occupying 2 or more stations, the same contents are indicated for as many as the number of occupied stations.

End

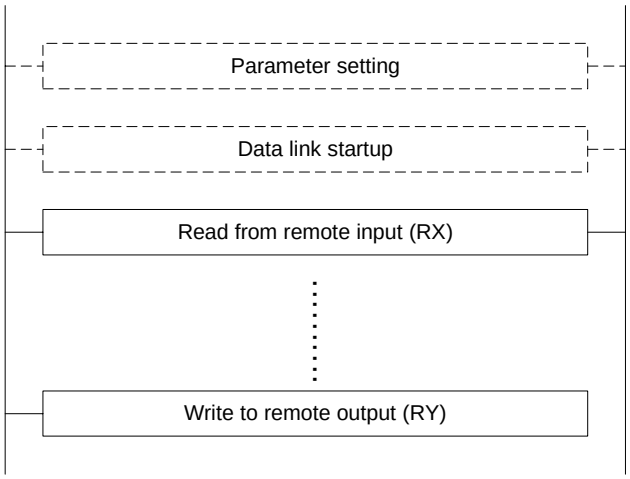
MEMO

9. Programming

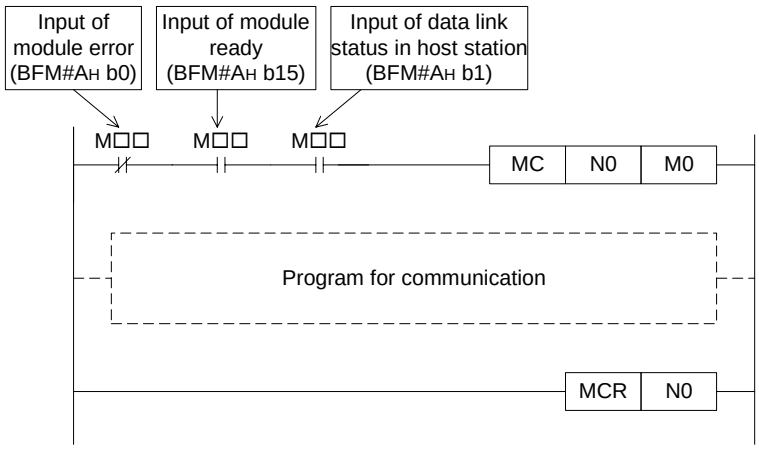
9.1 Precautions in Programming

This section describes precautions in creating a program.

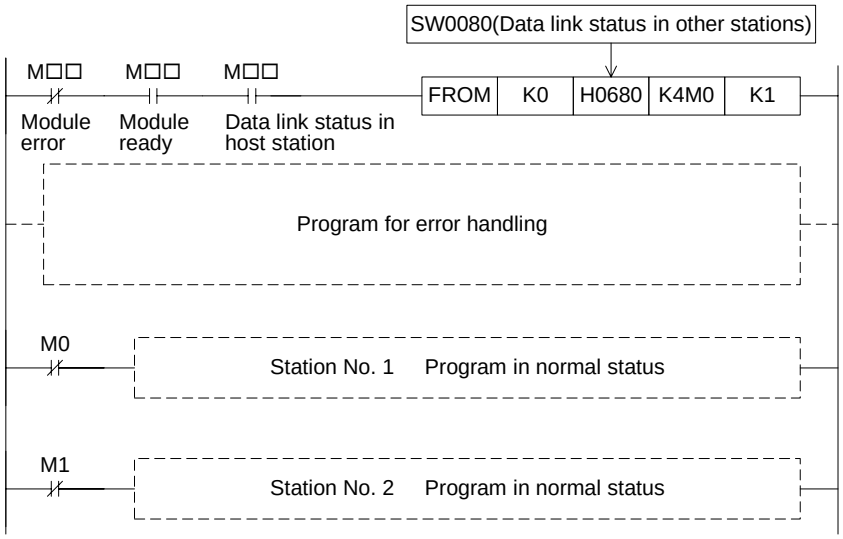
1) Create a read program from the remote input RX (addresses $E0_H$ to FF_H) after data link startup.
Create a write program to the remote output RY (addresses 160_H to $17F_H$) at the end of the entire program.



2) Create such a program that read of received data and write of transmission data are executed after the host station becomes the data link status (after the BFM#A$_H$ b1 turns ON).



3) Create such a program that detects the data link status in remote I/O stations and remote device stations and executes interlock.
Create a program for error handling.

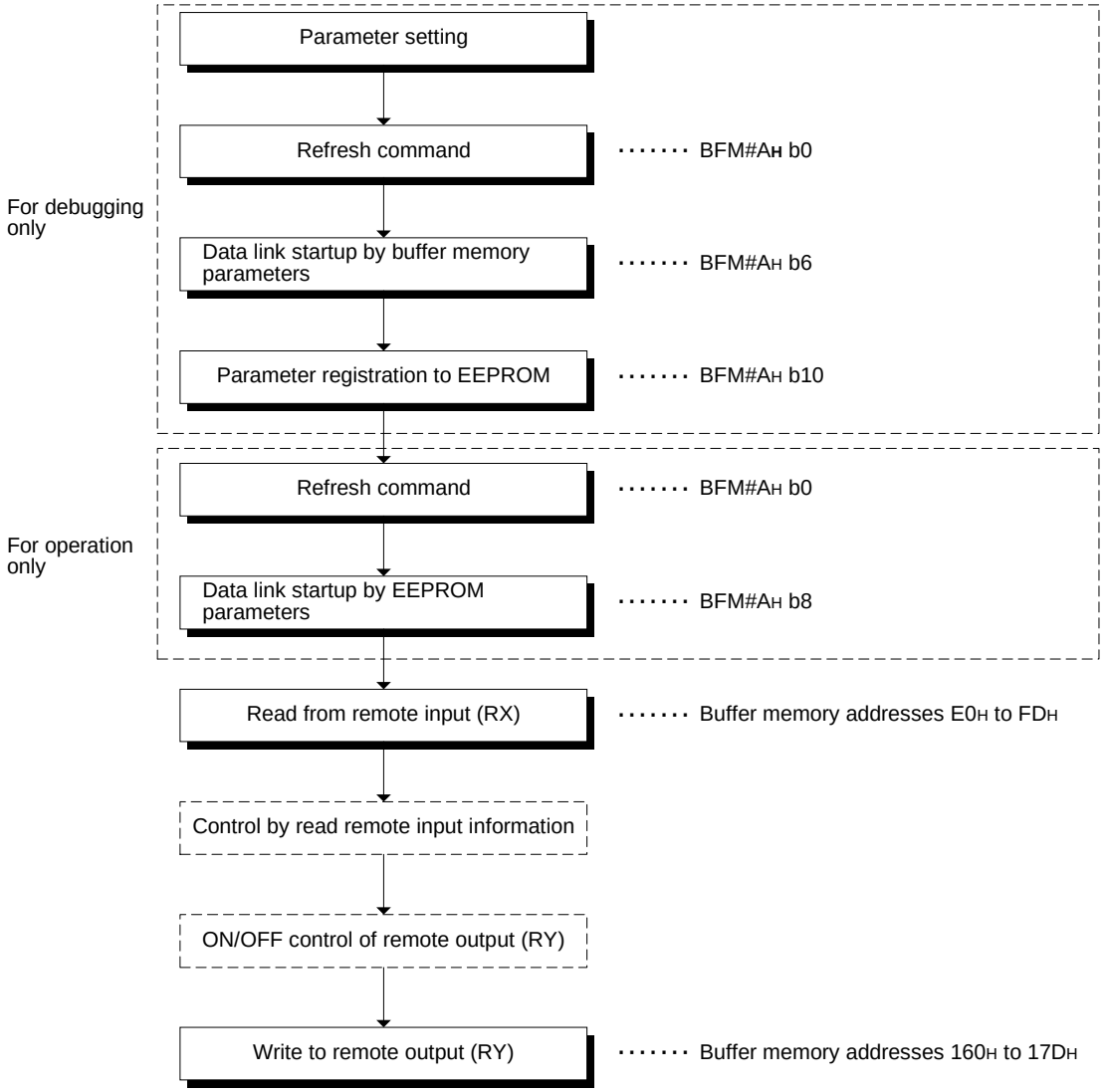


9.2 Programming Procedure

This section describes the program creation procedure.

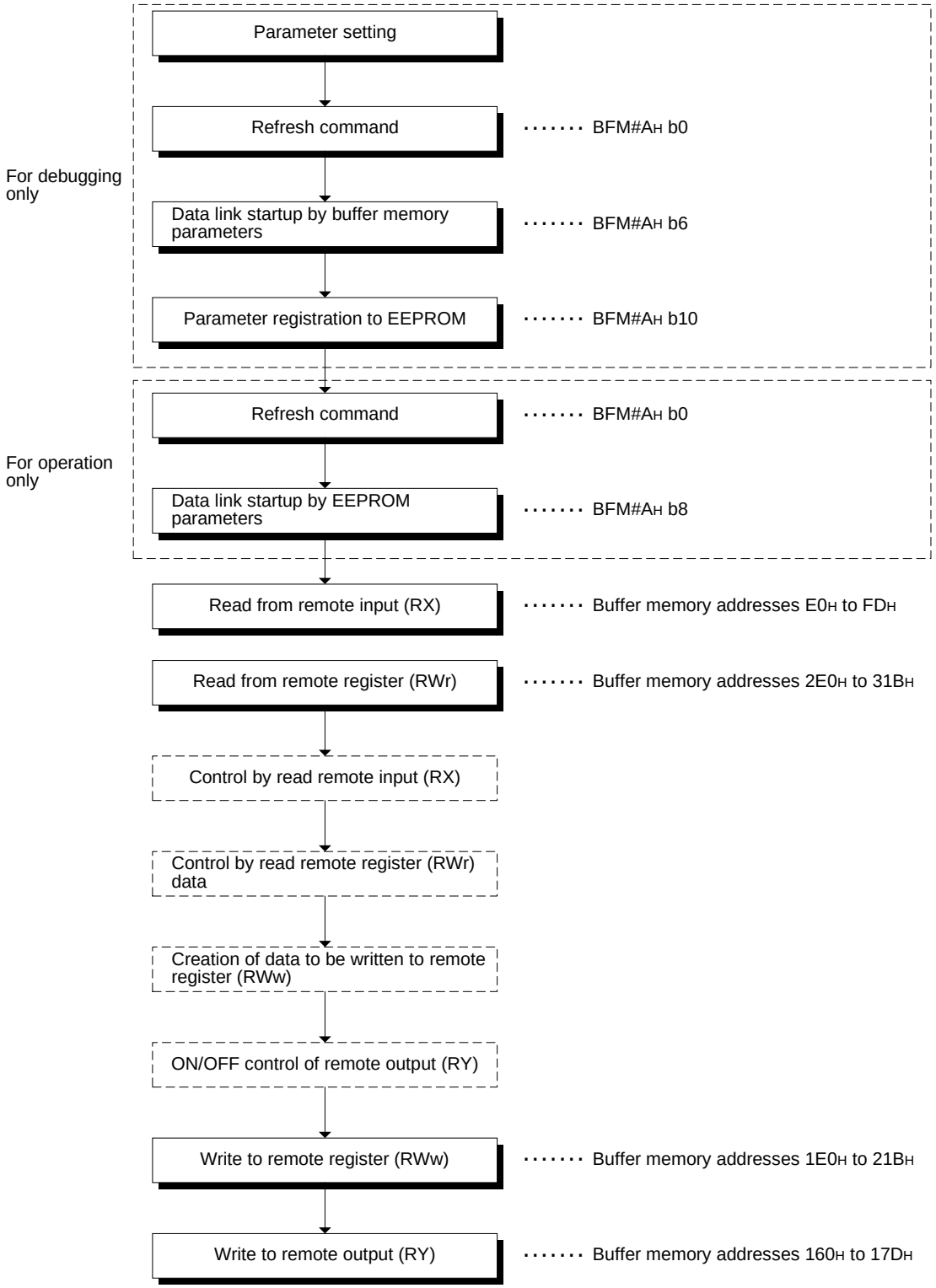
9.2.1 Communication between master station and remote I/O stations

The flowchart below shows the basic programming procedure for communication between the master station and remote I/O stations.
For a program example, refer to Chapter 10.



9.2.2 Communication between master station and remote device stations

The flowchart below shows the basic programming procedure for communication between the master station and remote device stations.
For a program example, refer to Chapter 11.



9.2.3 Communication in compound system

The basic programming procedure for the system where both remote I/O stations and remote device stations are present is equivalent to that described in "9.2.2 Communication between master station and remote device stations".

For a program example, refer to Chapter 12.

9.3 Link Special Relay/Register (SB/SW)

The data link status can be checked using the bit information (link special relay SB) and the word information (link special register SW).
"SB" and "SW" represent the buffer memory information in the master block, and can be read and written by the FROM/TO instruction.

- Link special relay (SB) :Buffer memory addresses 5E0H to 5FFH
- Link special register (SW) :Buffer memory addresses 600H to 7FFH

9.3.1 Link special relay (SB) list

For the correspondence with the buffer memory, refer to Section 4.4.10.

Table 9.1:

Number	Buffer memory		Name	Description
	Number	Bit		
SB0000	5E0H	0	Data link restart	Restarts the data link which was stopped by SB0002. OFF : Does not give restart specification. ON : Gives restart specification.
SB0002	5E0H	2	Data link stop	Stops the data link in the host station. (Use SB0000 to restart the data link.) If the master station sets this relay to ON, the entire system stops. OFF : Does not give stop specification. ON : Gives stop specification.
SB0004	5E0H	4	Request for temporary error invalid station	Determines stations specified by SW0003 to SW0004 as temporary error invalid stations. OFF : Does not give the request. ON : Gives the request.
SB0005	5E0H	5	Request for cancel of temporary error invalid station	Cancels the stations specified by SW0003 to SW0004 from temporary error invalid stations. OFF : Does not give the request. ON : Gives the request.
SB0008	5E0H	8	Request for line test	Executes the line test to the stations specified by SW0008. OFF : Does not give the request. ON : Gives the request.
SB0009	5E0H	9	Request for parameter verification test	Reads the parameter information on the actual system configuration, and sets it to the parameter information area. OFF : Does not give the request. ON : Gives the request.
SB0020	5E2H	0	Module status	Indicates the buffer access status. OFF : Does not give the request. ON : Gives the request.

Number	Buffer memory		Name	Description
	Number	Bit		
SB0040	5E4H	0	Data link restart acceptance status	Indicates the data link restart specification acceptance status. OFF : Not accepted ON : Accepted
SB0041	5E4H	1	Data link restart completion status	Indicates the data link restart specification acceptance completion status. OFF : Not completed ON : Completed
SB0044	5E4H	4	Data link stop acceptance status	Indicates the data link stop specification acceptance status. OFF : Not accepted ON : Accepted
SB0045	5E4H	5	Data link stop completion status	Indicates the data link stop specification acceptance completion status. OFF : Not completed ON : Completed
SB0048	5E4H	8	Temporary error invalid station acceptance status	Indicates the temporary error invalid station request acceptance status. OFF : Not accepted ON : Accepted
SB0049	5E4H	9	Temporary error invalid station completion status	Indicates the temporary error invalid station request acceptance completion status. OFF : Not completed ON : Completed (Temporary error invalid stations are determined.)
SB004A	5E4H	10	Temporary error invalid station cancel acceptance status	Indicates the temporary error invalid station cancel request acceptance status. OFF : Not accepted ON : Accepted
SB004B	5E4H	11	Temporary error invalid station cancel completion status	Indicates the temporary error invalid station cancel request acceptance completion status. OFF : Not completed ON : Completed (Cancel of temporary error invalid stations is completed.)
SB004C	5E4H	12	Line test acceptance status	Indicates the line test request acceptance status. OFF : Not accepted ON : Accepted
SB004D	5E4H	13	Line test completion status	Indicates the line test completion status. OFF : Not completed ON : Completed
SB004E	5E4H	14	Parameter verification test acceptance status	Indicates the parameter verification test request acceptance status. OFF : Not accepted ON : Accepted
SB004F	5E4H	15	Parameter verification test completion status	Indicates the parameter verification test completion status. OFF : Not completed ON : Completed

Number	Buffer memory		Name	Description
	Number	Bit		
SB0050	5E5H	0	Offline test execution status	Indicates the offline test execution status. OFF : Not executed ON : Being executed
SB0060	5E6H	0	Module mode	Indicates the setting status of the mode setting switch in the module. OFF : Online (0) ON : Other than online (0)
SB0061	5E6H	1	Station type	Indicates the setting status of the station number setting switch in the module. OFF : Master station (No. 0) ON : Setting error (The station number is not set to 0.)
SB0065	5E6H	5	Input status of data link faulty station	Indicates the setting status of the condition setting switch (DIP switch SW4) in the module. OFF : Clear ON : Keep
SB006A	5E6H	10	Switch setting status	Indicates the switch setting status. OFF : Normal ON : Setting error (The error code is stored in SW006A.)
SB006D	5E6H	13	Parameter setting status	Indicates the parameter setting status. OFF : Normal ON : Setting error (The error code is stored in SW0068.)
SB006E	5E6H	14	Operation status in host station	Indicates the data link operation status in the host station. OFF : In progress ON : Not executed
SB0073	5E7H	3	Status of operation specification against CPU down	Indicates the status of operation specification against CPU down by parameter. OFF : Stop ON : Continue
SB0074	5E7H	4	Reserved station specification status	Indicates the reserved station specification status by parameter (SW0074). OFF : Not specified ON : Specified

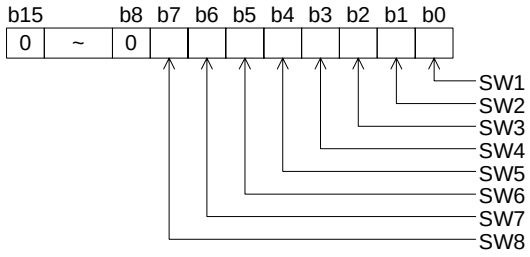
Number	Buffer memory		Name	Description
	Number	Bit		
SB0075	5E7H	5	Error invalid station specification status	Indicates the error invalid station specification status by parameter (SW0078). OFF : Not specified ON : Specified
SB0076	5E7H	6	Temporary error invalid station specification status	Indicates the temporary error invalid station specification status (SW007C). OFF : Not specified ON : Specified
SB0078	5E7H	8	Switch change status in host station	Detects change in the setting switches in the host station during data link. OFF : No change ON : Change
SB0080	5E8H	0	Data link status in other stations	Indicates the data link status with remote stations (SW0080). OFF : All stations are normal. ON : Some stations are faulty.
SB0081	5E8H	1	Watchdog timer error status in other stations	Indicates the watchdog timer error occurrence status in other stations (SW0084). OFF : No error ON : Error
SB0082	5E8H	2	Fuse blowout status in other stations	Indicates the fuse blowout occurrence status in other stations (SW0088). OFF : No error ON : Error
SB0083	5E8H	3	Switch change status in other stations	Detects change in the setting switches in other stations during data link (SW008C). OFF : No change ON : Change

9.3.2 Link special register (SW)

Table 9.2:

Number	Buffer memory	Name	Description
SW0003	603H	Specification of multiple temporary error invalid stations	Selects whether or not to specify two or more temporary error invalid stations. 00: Specifies two or more stations stored in SW0004. 01 to 15 : Specifies a single station whose station number is 1 to 15. * The number indicates the station number of a temporary error invalid station.
SW0004	604H	Temporary error invalid station specification *1	Specifies temporary error invalid stations. 0: Does not specify as temporary error invalid station. 1: Specifies as temporary error invalid station. b15 b14 b13 b12 ~ b3 b2 b1 b0 SW0004 — 15 14 13 ~ 4 3 2 1 Numbers 1 to 15 above indicate station numbers
SW0008	608H	Line test station setting	Sets the stations to be subject to the line test. 0 : Entire system (The line test will be executed to all stations.) 01 to 15 : Station to be subject to the line test. Default : 0
SW0020	620H	Module status	Indicates the module status. 0 : Normal Other than 0: Error code (Refer to Section 13.3.)
SW0041	641H	Result of data link restart	Stores the execution result of data link restart specification by SB0000. 0 : Normal Other than 0: Error code (Refer to Section 13.3.)
SW0045	645H	Result of data link stop	Stores the execution result of data link stop specification by SB0002. 0 : Normal Other than 0: Error code (Refer to Section 13.3.)
SW0049	649H	Result of request for temporary error invalid stations	Stores the execution result of request for temporary error invalid stations by SB0004. 0 : Normal Other than 0: Error code (Refer to Section 13.3.)
SW004B	64BH	Result of request for cancel of temporary error invalid stations	Stores the execution result of request for cancel of temporary error invalid stations by SB0005. 0 : Normal Other than 0: Error code (Refer to Section 13.3.)
SW004D	64DH	Result of request for line test	Stores the execution result of request for line test by SB0008. 0 : Normal Other than 0: Error code (Refer to Section 13.3.)

*1 Sets to ON only the bit corresponding to the head station number

Number	Buffer memory	Name	Description
SW004F	64FH	Result of request for parameter verification test	Indicates the execution result of request for parameter verification test by SB0009. 0 : Normal: Other than 0: Error code
SW0060	660H	Mode setting switch status	Stores the setting status of the mode setting switch. 0 : Online 2 : Offline 3 : Line test 1 4 : Line test 2 5 : Parameter verification test 6 : Hardware test 1, 7 to F : Setting error
SW0061	661H	Station number setting switch status	Stores the setting status of the station number setting switch. 0 : Master station (Make sure to set the switch to 0) Other than 0: Setting error
SW0062	662H	Condition setting switch status	Stores the setting status of the condition setting switch (DIP switch). 0: OFF 1: ON 
SW0064	664H	Number of retries setting status	Stores the setting status of the number of retries against response error. 1 to 7 (times)
SW0065	665H	Number of automatic return stations setting status	Stores the setting status of the number of automatic return modules during one link scan. 1 to 10 (modules)
SW0067	667H	Parameter information	Stores the parameter information area to be used. 1: Buffer memory (data link startup by BFM#AH b6) 2: EEPROM (data link startup by BFM#AH b8)
SW0068	668H	Parameter status in host station	Stores the parameter setting status. 0 : Normal Other than 0: Error code (Refer to Section 13.3.)
SW0069	669H	Loading status *2	Stores station number overlap and consistency with parameters in each module. 0 : Normal Other than 0: Error code (Refer to Section 13.3.) * The details are stored in SW0098 and SW009C.
SW006A	66AH	Switch setting status	Stores the switch setting status. 0 : Normal Other than 0: Error code (Refer to Section 13.3.)
SW006D	66DH	Maximum link scan time	Stores the maximum value of the link scan time (unit: 1 ms).

*2 The loading status is checked only when link starts up, then stored.

Number	Buffer memory	Name	Description
SW006E	66EH	Current link scan time	Stores the current value of the link scan time (unit: 1 ms).
SW006F	66FH	Minimum link scan time	Stores the minimum value of the link scan time (unit: 1 ms).
SW0070	670H	Total number of stations	Stores the last station number set in parameter. 1 to 15 (stations)
SW0071	671H	Maximum communication station number	Stores the maximum station number (station number set by the station number setting switch) in the data link. 1 to 15 (stations)
SW0072	672H	Number of connected modules	Stores the number of modules (except reserved stations) in the data link. 1 to 15 (modules)
SW0074	674H	Reserved station specification status*1	Stores the reserved station specification status. 0: Not specified as reserved station 1: Specified as reserved station b15 b14 b13 b12 ~ b3 b2 b1 b0 SW0074 — 15 14 13 ~ 4 3 2 1 Numbers 1 to 15 above indicate station numbers
SW0078	678H	Error invalid station specification status*1	Stores the error invalid station specification status. 0: Not specified as error invalid station 1: Specified as error invalid station b15 b14 b13 b12 ~ b3 b2 b1 b0 SW0078 — 15 14 13 ~ 4 3 2 1 Numbers 1 to 15 above indicate station numbers
SW007C	67CH	Temporary error invalid station specification status*1	Stores the temporary error invalid station specification status. 0: Not specified as temporary error invalid station 1: Specified as temporary error invalid station b15 b14 b13 b12 ~ b3 b2 b1 b0 SW007C — 15 14 13 ~ 4 3 2 1 Numbers 1 to 15 above indicate station numbers

*1 Only the bit corresponding to the head station number is set to ON.

Number	Buffer memory	Name	Description
SW0080	680H	Data link status in other stations *3	Stores the data link status in each station. 0: Normal 1: Data link error b15 b14 b13 b12 ~ b3 b2 b1 b0 SW0080 — 15 14 13 ~ 4 3 2 1 Numbers 1 to 15 above indicate station numbers
SW0084	684H	Watchdog timer error occurrence status in other stations *1	Stores the watchdog timer error occurrence status in each station. 0: Normal 1: Watchdog timer error b15 b14 b13 b12 ~ b3 b2 b1 b0 SW0084 — 15 14 13 ~ 4 3 2 1 Numbers 1 to 15 above indicate station numbers
SW0088	688H	Fuse blowout status in other stations *3	Stores the fuse blowout status in each station. 0: Normal 1: Fuse blowout error b15 b14 b13 b12 ~ b3 b2 b1 b0 SW0088 — 15 14 13 ~ 4 3 2 1 Numbers 1 to 15 above indicate station numbers
SW008C	68CH	Switch change status in other stations *1	Stores the switch change status in other stations during data link. 0: No change 1: Change b15 b14 b13 b12 ~ b3 b2 b1 b0 SW008C — 15 14 13 ~ 4 3 2 1 Numbers 1 to 15 above indicate station numbers

*1 Only the bit corresponding to the head station number is set to ON.

*3 Bits corresponding to as many as the number of occupied stations are set to ON.

Number	Buffer memory	Name	Description
SW0098	698H	Station number overlap status *4	Stores the overlap status in which the head station number of each module does not overlap. 0: Normal 1: Station number overlap (only the head station number) b15 b14 b13 b12 ~ b3 b2 b1 b0 SW0098 — 15 14 13 ~ 4 3 2 1 Numbers 1 to 15 above indicate station numbers
SW009C	69CH	Loading/parameter consistency status *4	Stores the consistency with parameters. 0: Normal 1: Consistency error Loading Parameter Remote device station↔ Remote I/O station b15 b14 b13 b12 ~ b3 b2 b1 b0 SW009C — 15 14 13 ~ 4 3 2 1 Numbers 1 to 15 above indicate station numbers
SW00B4	6B4H	Line test 1 result *3	Stores the line test 1 result. 0: Normal 1: Error b15 b14 b13 b12 ~ b3 b2 b1 b0 SW00B4 — 15 14 13 ~ 4 3 2 1 Numbers 1 to 15 above indicate station numbers

*3 Bits corresponding to as many as the number of occupied stations are set to ON.

*4 Only the bit corresponding to the head station number is set to ON.
The status is checked only when link starts up, and stored.

Number	Buffer memory	Name	Description
SW00B8	6B8H	Line test 2 result	Stores the line test 2 result. 0 : Normal Other than 0: Error code (Refer to Section 13.3.)
SW00B9	6B9H	EEPROM registration status	Stores the status of parameter registration to the EEPROM. 0 : Normal Other than 0: Error code (Refer to Section 13.3.)

The timing at which the data in the link special registers (SW) is updated varies depending on the register number as shown in the table below.

Table 9.3:

Link special register	Data update timing	Link special register	Data update timing
SW0041	Updated independently without regard to SB	SW0071	Updated independently without regard to SB (updated after each station is stabilized)
SW0045		SW0072	
SW0060	Updated when SB0060 changes	SW0074	Updated when SB0074 changes
SW0061	Updated when SB0061 changes	SW0078	Updated when SB0075 changes
SW0062	Updated independently without regard to SB	SW0080	Updated when SB0080 changes
SW0067		SW0088	Updated independently without regard to SB
SW0069		SW0098	Updated independently without regard to SB
SW006A		SW009C	
SW006D		SW00B4	
SW006E		SW00B8	
SW006F		SW00B9	
SW0070		—	—

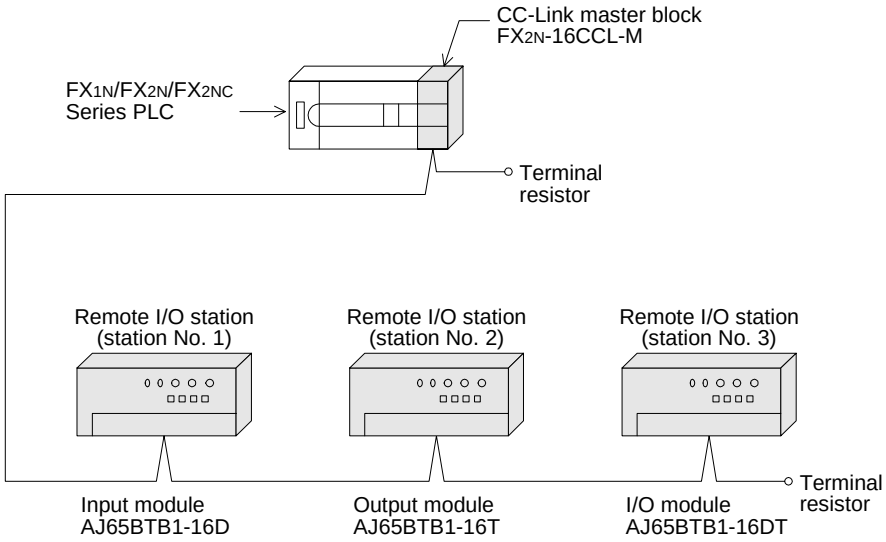
MEMO

10. Communication between Master Station and Remote I/O Stations

This chapter describes module setting, programming and operation check using a system configuration example.

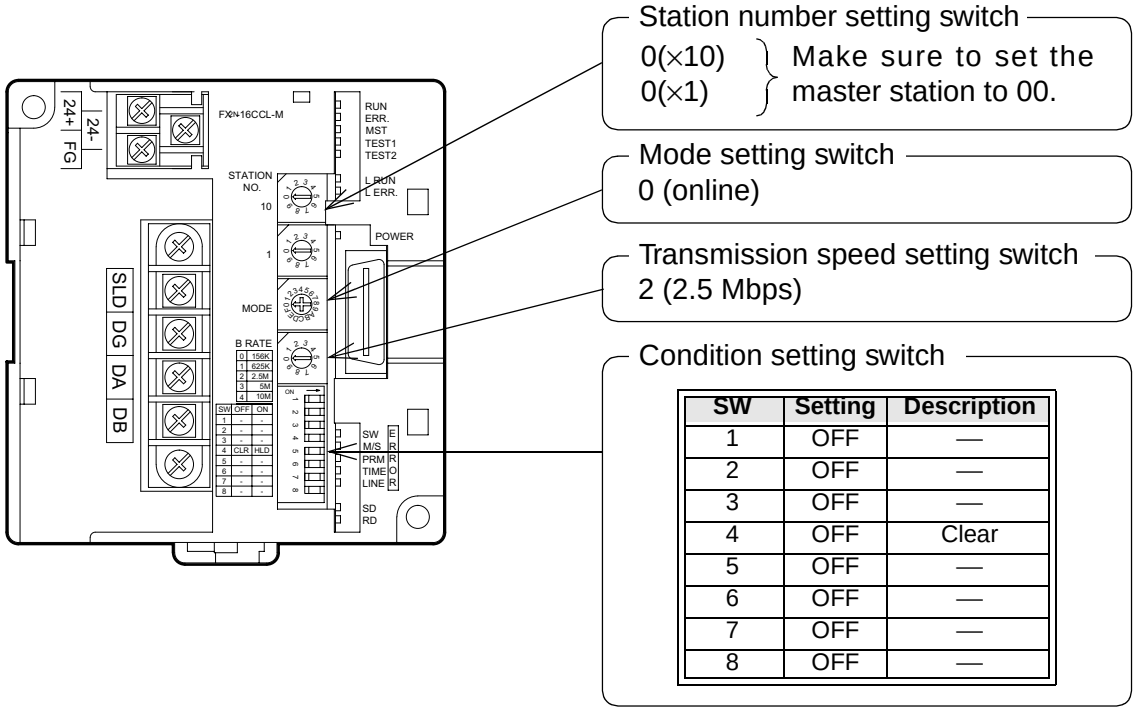
10.1 System Configuration

It is supposed that three remote I/O stations are connected in the system.



10.1.1 Setting of master station

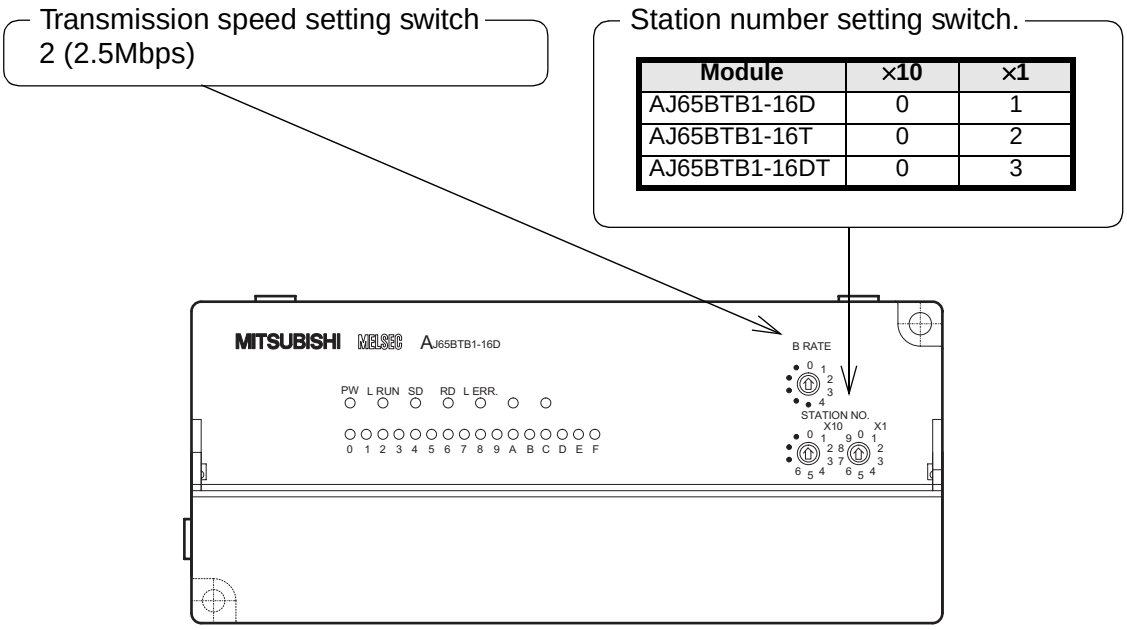
The figure below shows the setting of the switches in the master station.



SW	Setting	Description
1	OFF	—
2	OFF	—
3	OFF	—
4	OFF	Clear
5	OFF	—
6	OFF	—
7	OFF	—
8	OFF	—

10.1.2 Setting of remote I/O station

The figure below shows the setting of the switches in a remote I/O station.



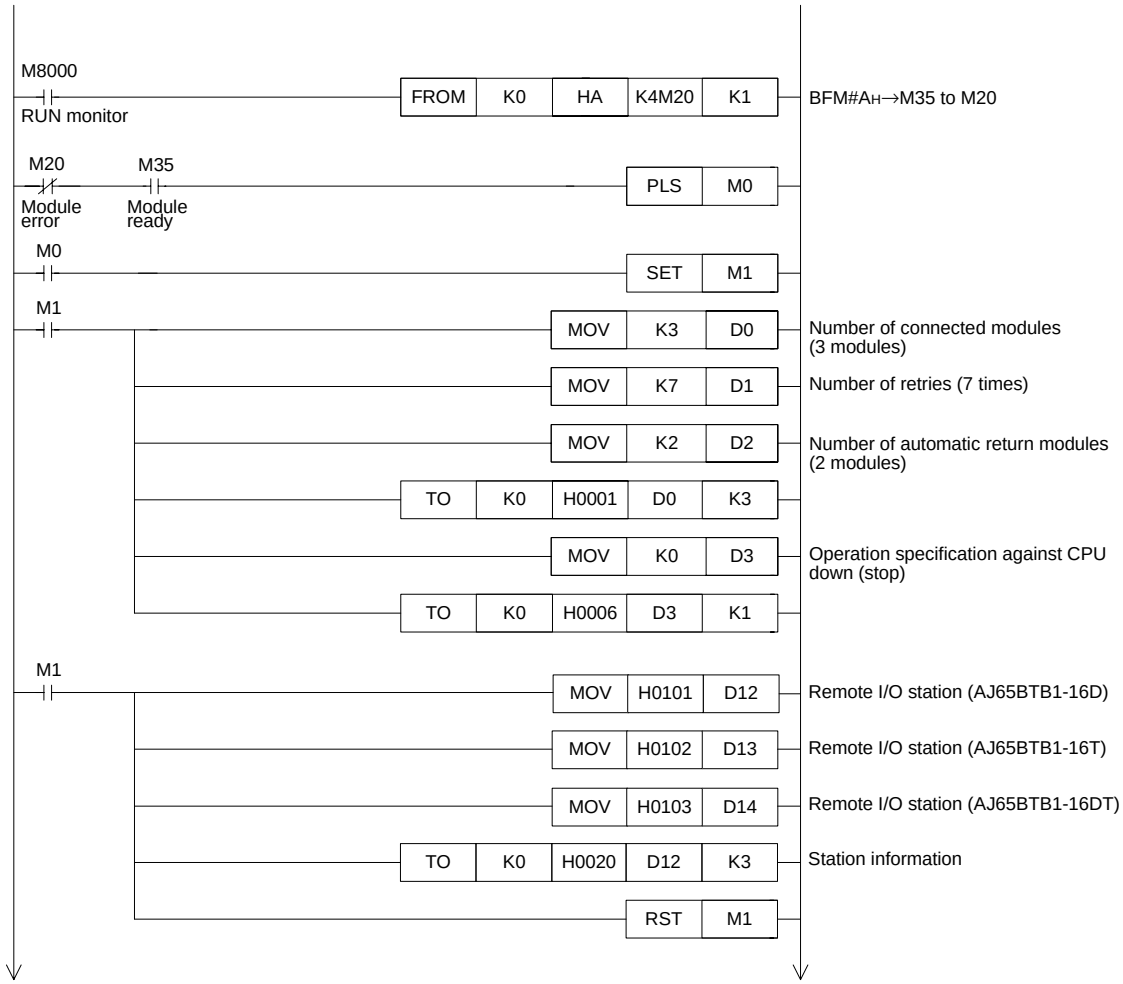
Module	×10	×1
AJ65BTB1-16D	0	1
AJ65BTB1-16T	0	2
AJ65BTB1-16DT	0	3

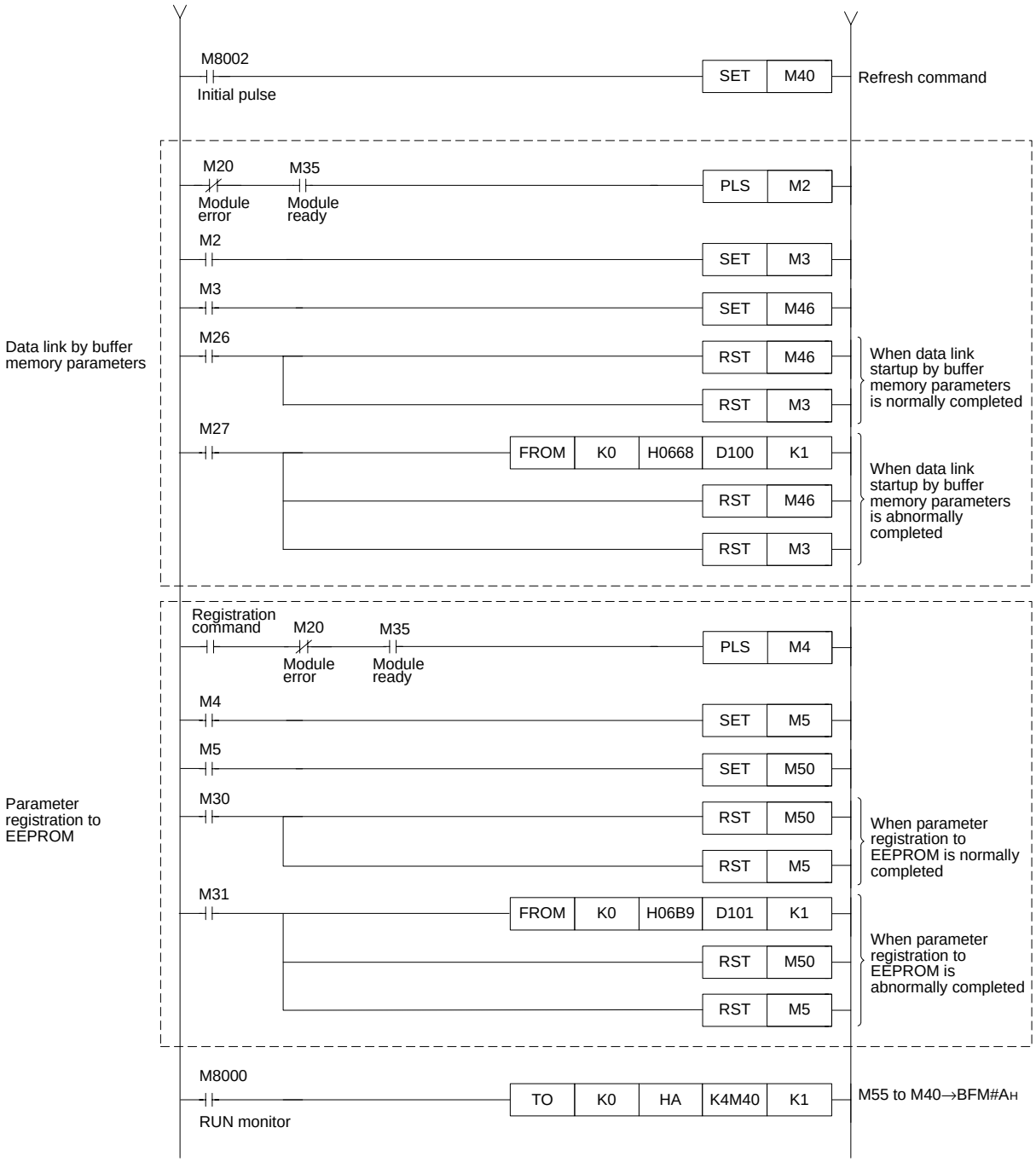
10.2 Creating a Program

10.2.1 Program for parameters

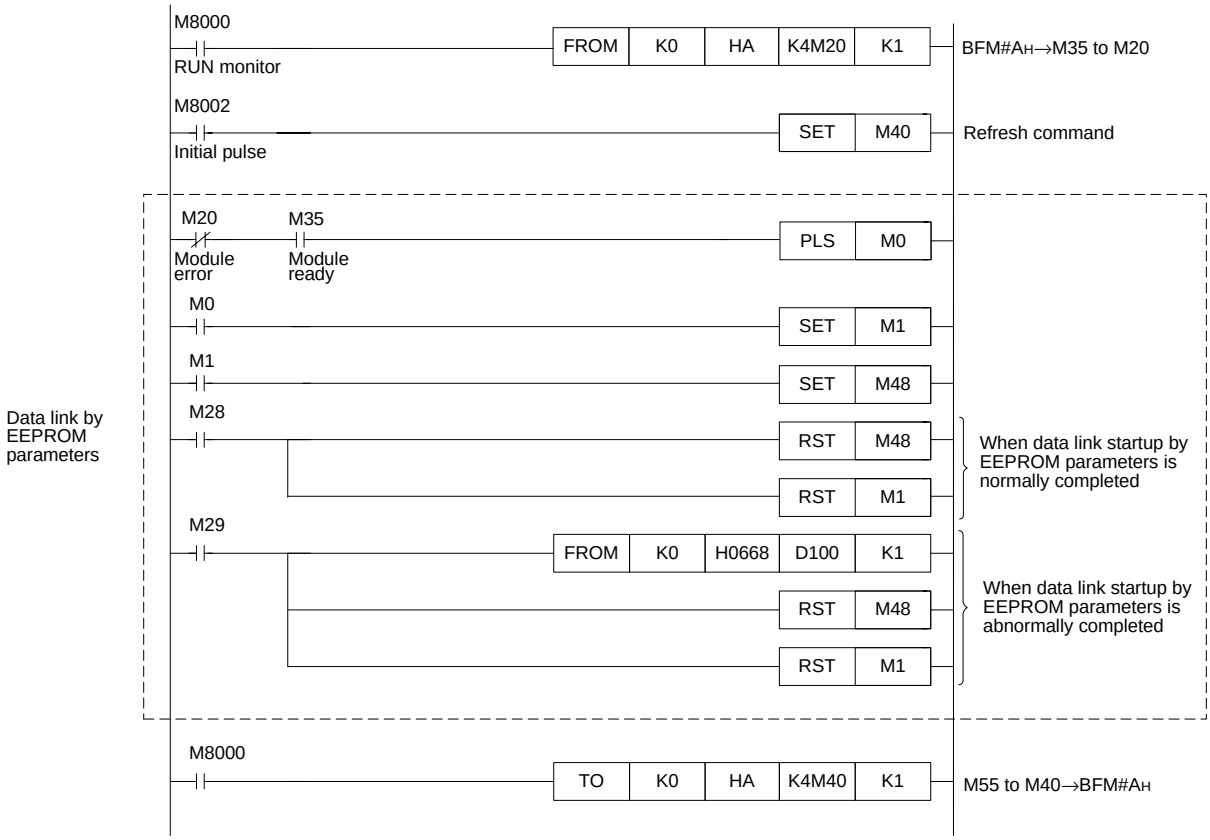
In the program below, data link automatically starts when the PLC starts to run.

[For debugging]



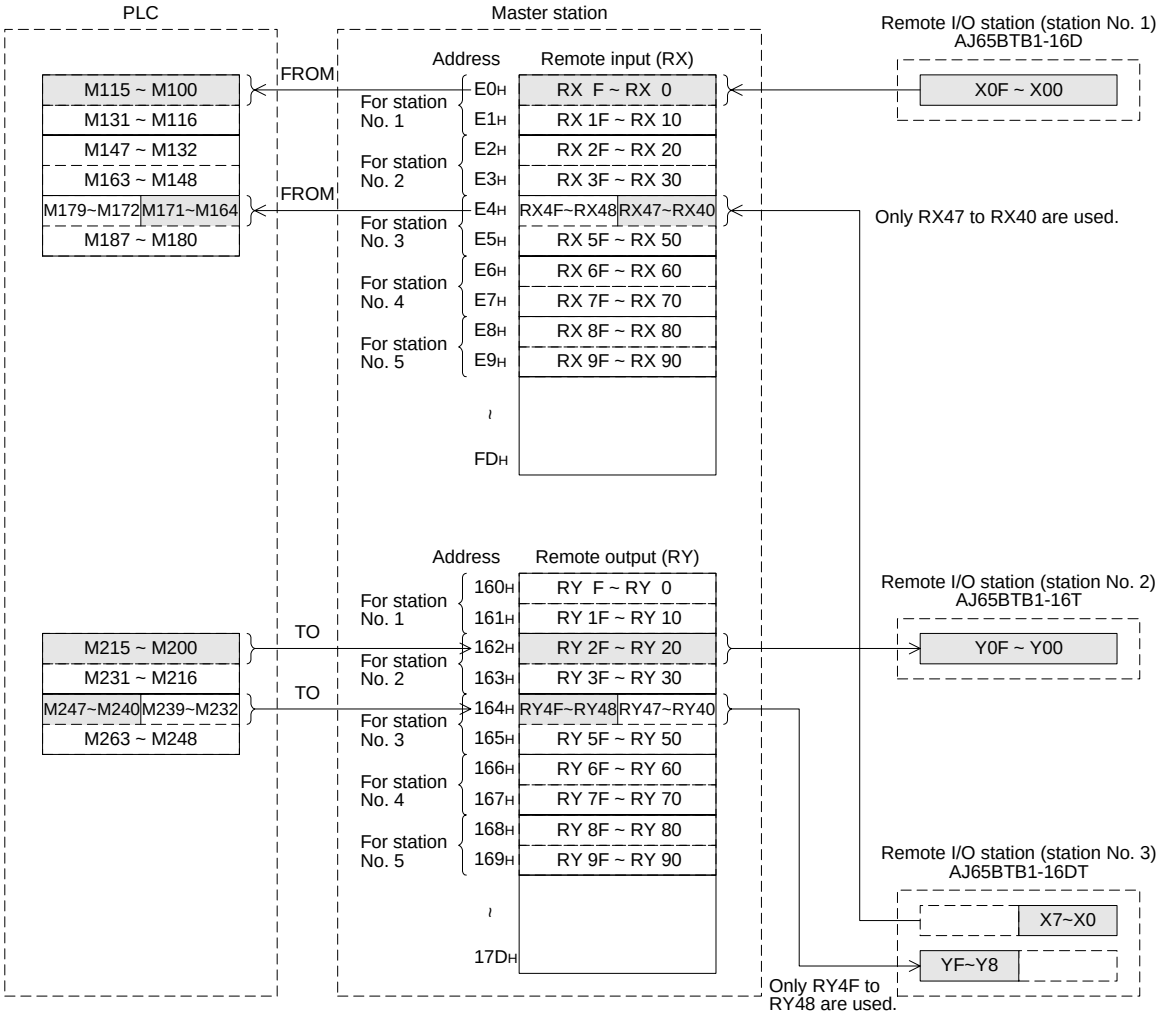

M8002
Initial pulse
SET M40
Refresh command
Data link by buffer memory parameters
M20
Module error
M35
Module ready
PLS M2
M2
SET M3
M3
SET M46
M26
RST M46
RST M3
When data link startup by buffer memory parameters is normally completed
M27
FROM K0 H0668 D100 K1
RST M46
RST M3
When data link startup by buffer memory parameters is abnormally completed
Parameter registration to EEPROM
Registration command
M20
Module error
M35
Module ready
PLS M4
M4
SET M5
M5
SET M50
M30
RST M50
RST M5
When parameter registration to EEPROM is normally completed
M31
FROM K0 H06B9 D101 K1
RST M50
RST M5
When parameter registration to EEPROM is abnormally completed
M8000
RUN monitor
TO K0 HA K4M40 K1
M55 to M40→BFM#AH

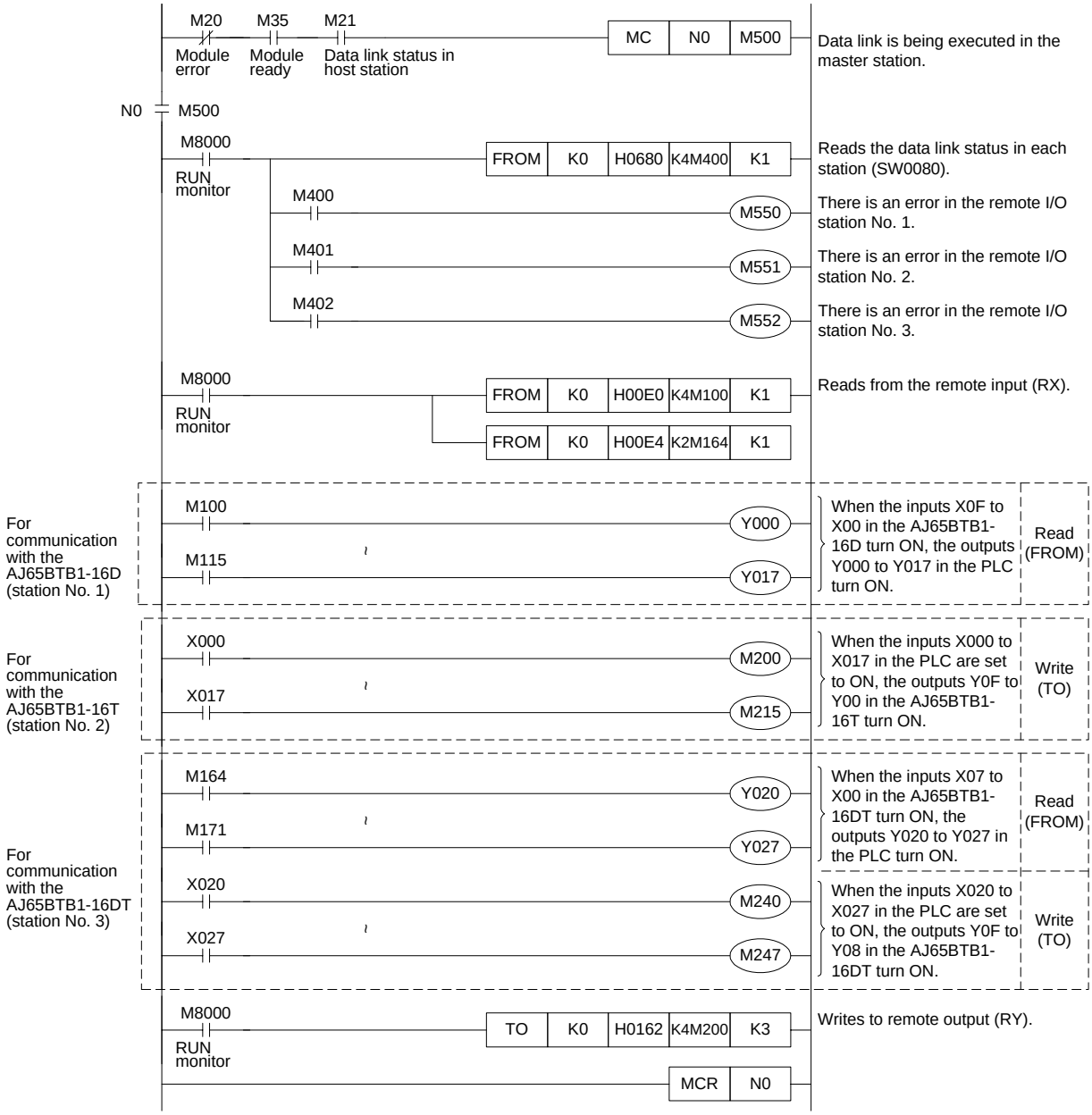
[For operation]



10.2.2 Program for communication

The figure below shows a program to control remote I/O stations.
It is supposed that the relationship among the PLC, the master station buffer memory and the remote I/O stations is as shown below.




M20
M35
M21
Module error
Module ready
Data link status in host station
MC N0 M500
Data link is being executed in the master station.
N0 M500
M8000
RUN monitor
FROM K0 H0680 K4M400 K1
Reads the data link status in each station (SW0080).
M400
M550
There is an error in the remote I/O station No. 1.
M401
M551
There is an error in the remote I/O station No. 2.
M402
M552
There is an error in the remote I/O station No. 3.
M8000
RUN monitor
FROM K0 H00E0 K4M100 K1
FROM K0 H00E4 K2M164 K1
Reads from the remote input (RX).
For communication with the AJ65BTB1-16D (station No. 1)
M100
M115
Y000
Y017
When the inputs X0F to X00 in the AJ65BTB1-16D turn ON, the outputs Y000 to Y017 in the PLC turn ON.
Read (FROM)
For communication with the AJ65BTB1-16T (station No. 2)
X000
X017
M200
M215
When the inputs X000 to X017 in the PLC are set to ON, the outputs Y0F to Y00 in the AJ65BTB1-16T turn ON.
Write (TO)
For communication with the AJ65BTB1-16DT (station No. 3)
M164
M171
Y020
Y027
When the inputs X07 to X00 in the AJ65BTB1-16DT turn ON, the outputs Y020 to Y027 in the PLC turn ON.
Read (FROM)
X020
X027
M240
M247
When the inputs X020 to X027 in the PLC are set to ON, the outputs Y0F to Y08 in the AJ65BTB1-16DT turn ON.
Write (TO)
M8000
RUN monitor
TO K0 H0162 K4M200 K3
Writes to remote output (RY).
MCR N0

10.3 Execution of Data Link

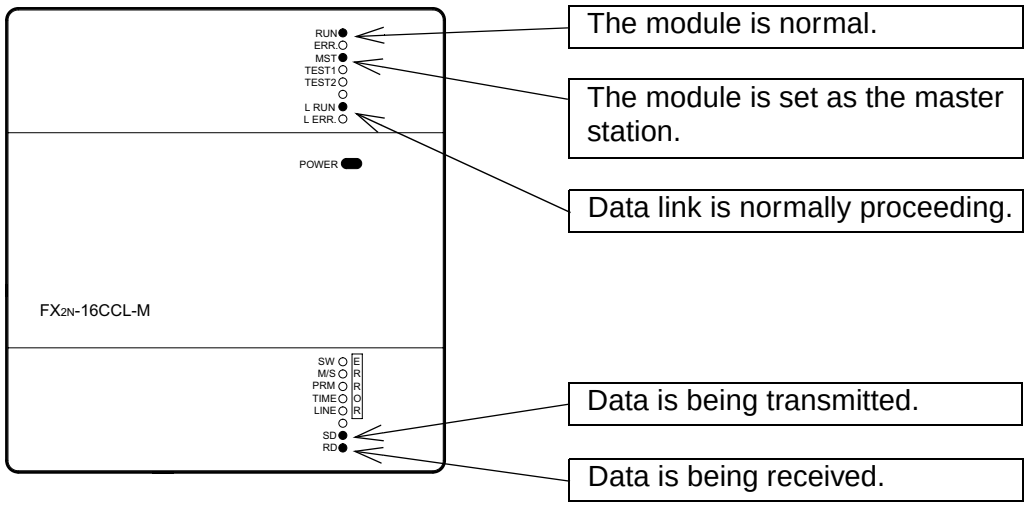
Turn on the power of the remote I/O stations first, turn on the power of the master station, then start the data link.

10.3.1 Confirmation of operation by LED indication

The figures below show the LED indication status in the master station and the remote I/O stations while the data link is normally proceeding.

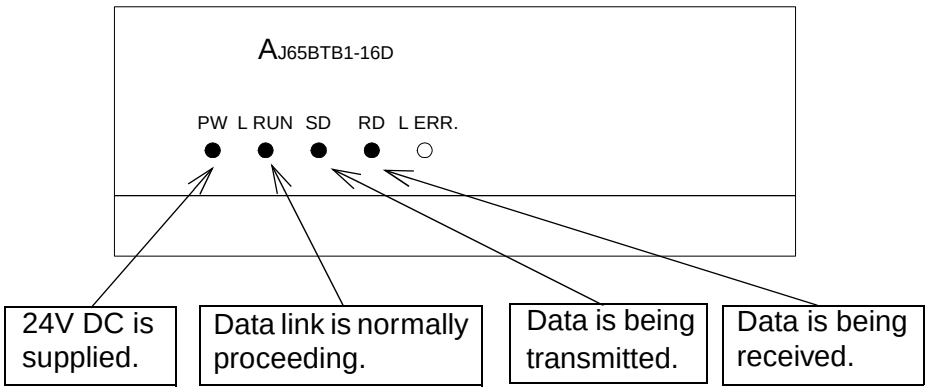
1) LED indication in the master station

Make sure that the LED indication status is as shown below.



2) LED indication in the remote I/O station

Make sure that the LED indication status is as shown below.

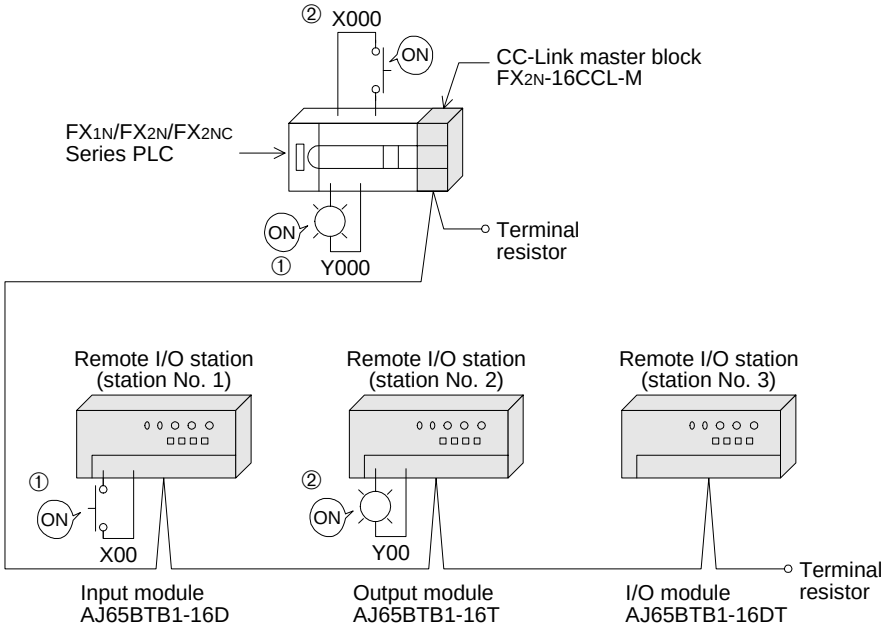


10.3.2 Confirmation of operation by program

Using a sequence program, make sure that data link is normally proceeding.

① For example, when the input X00 in the remote I/O station AJ65BTB1-16D (station No. 1) is set to ON, the output Y000 in the master station turns ON.

② When the input X000 in the master station is set to ON, the output Y00 in the remote I/O station AJ65BTB1-16T (station No. 2) turns ON.



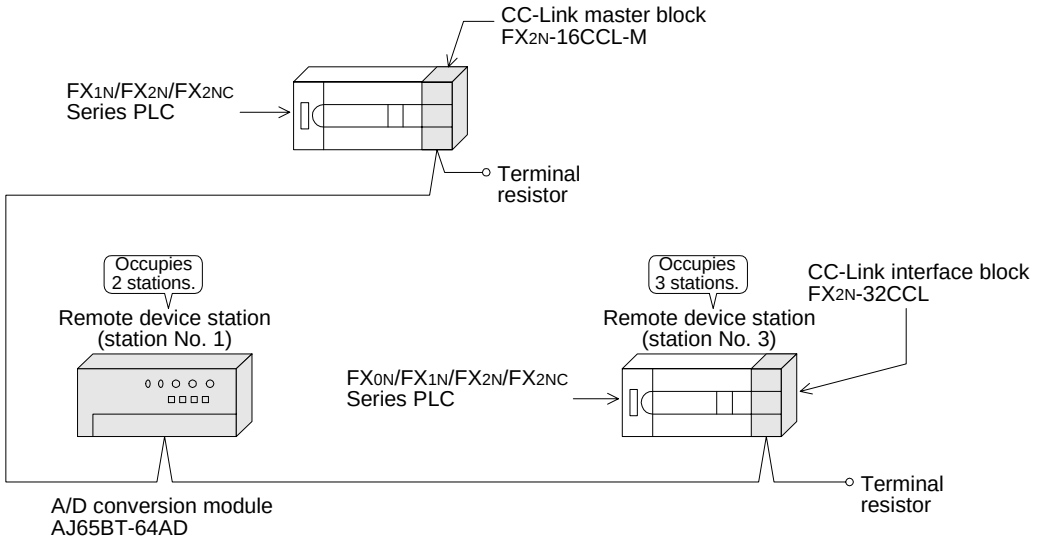
MEMO

11. Communication between Master Station and Remote Device Stations

This chapter describes module setting, programming and operation check using a system configuration example.

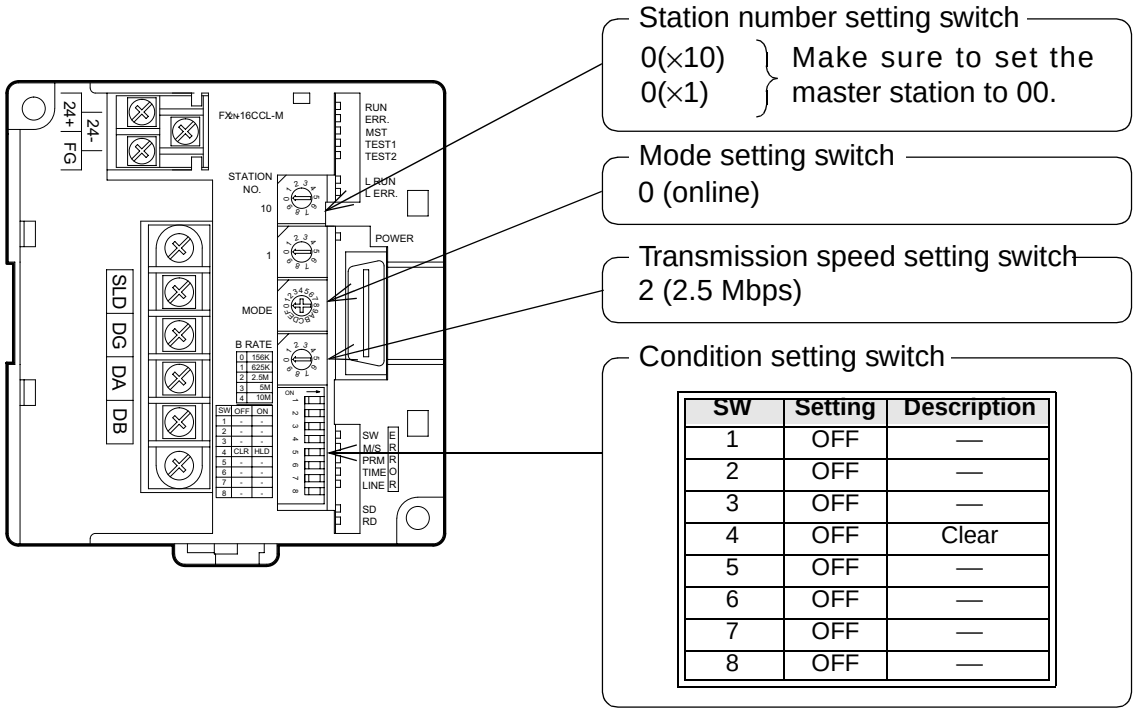
11.1 System Configuration

It is supposed that two remote device stations are connected in the system.



11.1.1 Setting of master station

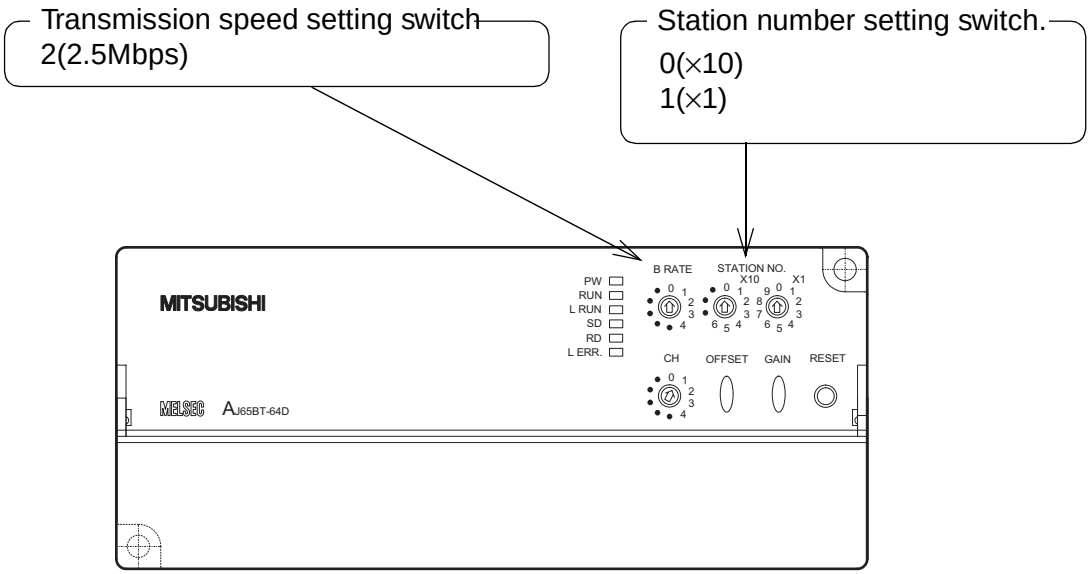
The figure below shows the setting of the switches in the master station.



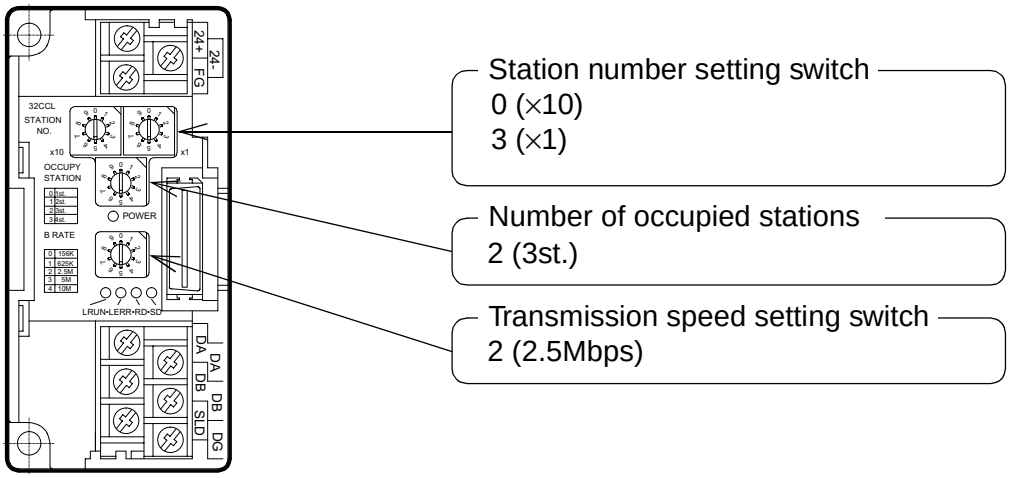
SW	Setting	Description
1	OFF	—
2	OFF	—
3	OFF	—
4	OFF	Clear
5	OFF	—
6	OFF	—
7	OFF	—
8	OFF	—

11.1.2 Setting of remote device station

The figure below shows the setting of the switches in a remote device station.



FX2N-32CCL

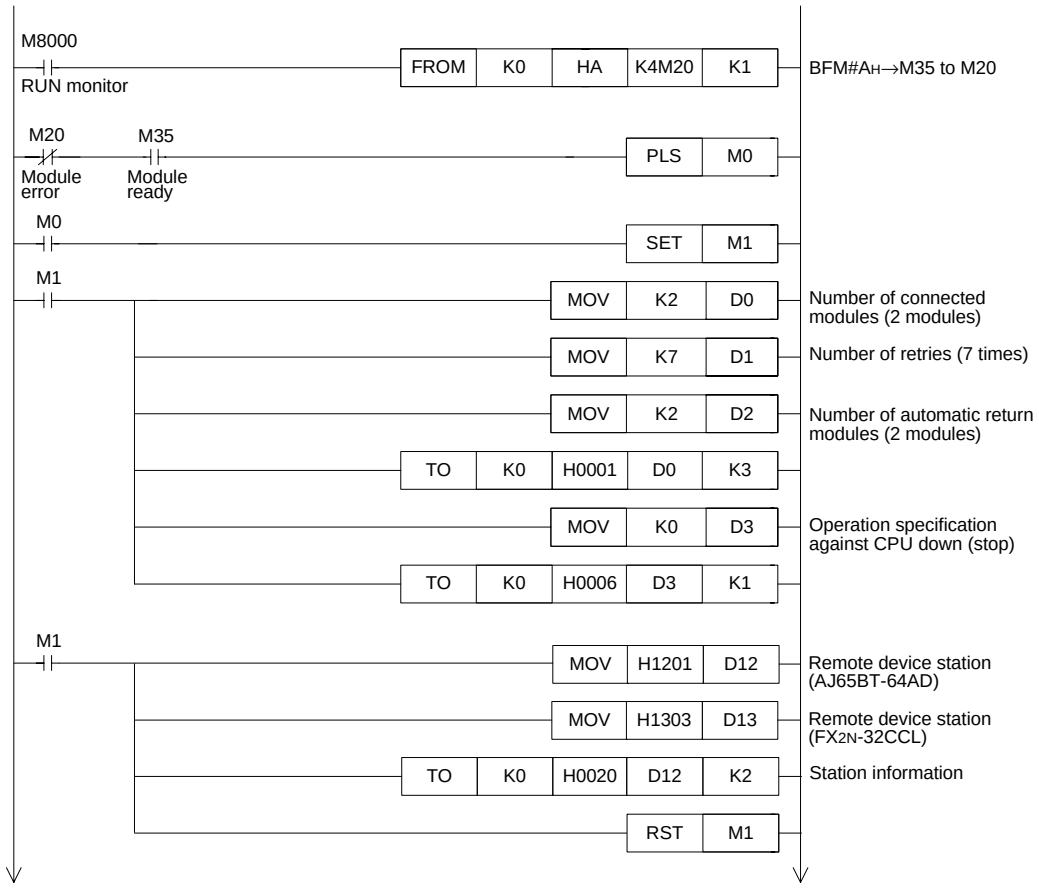


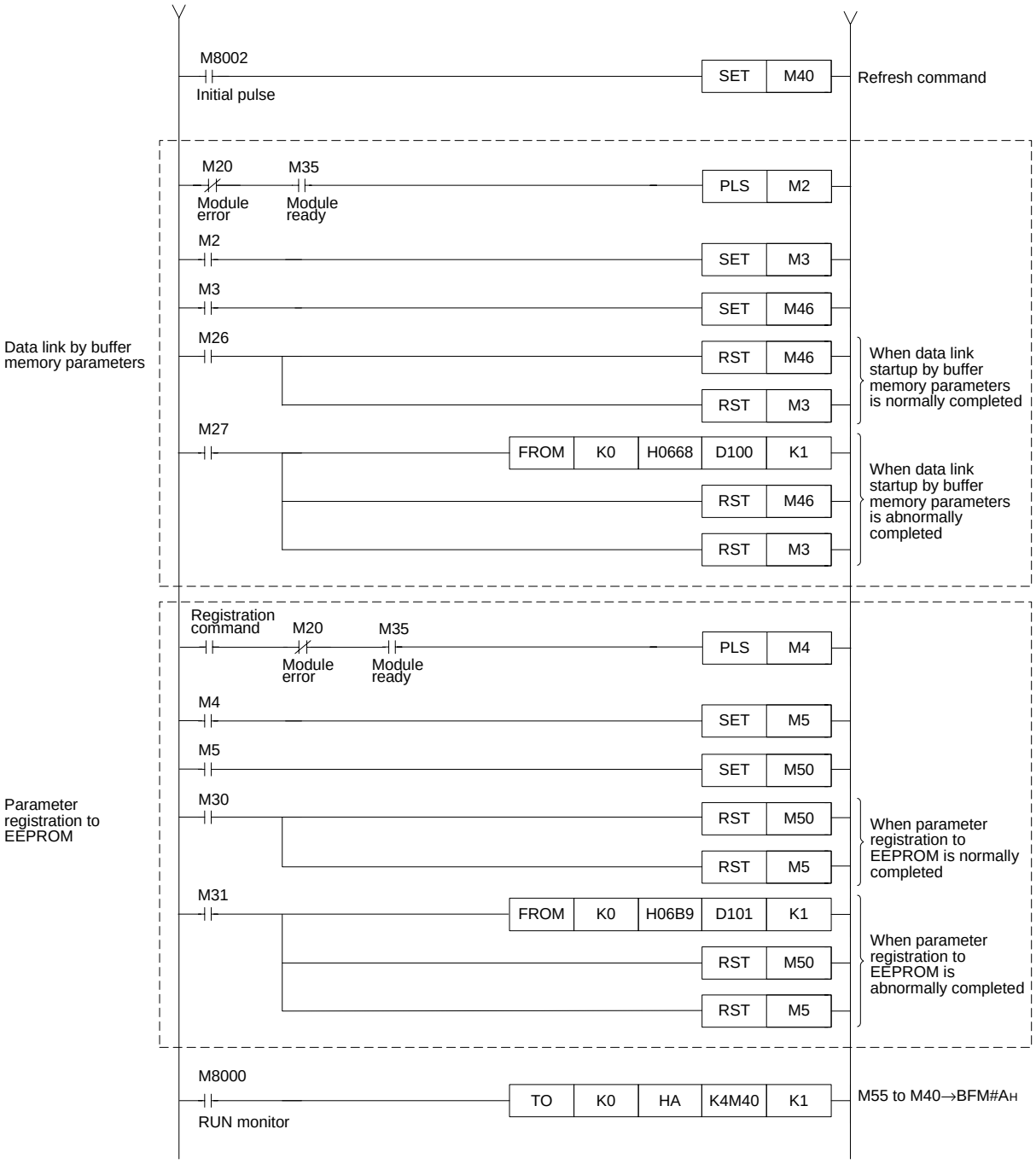
11.2 Creating a Program

11.2.1 Program for parameters

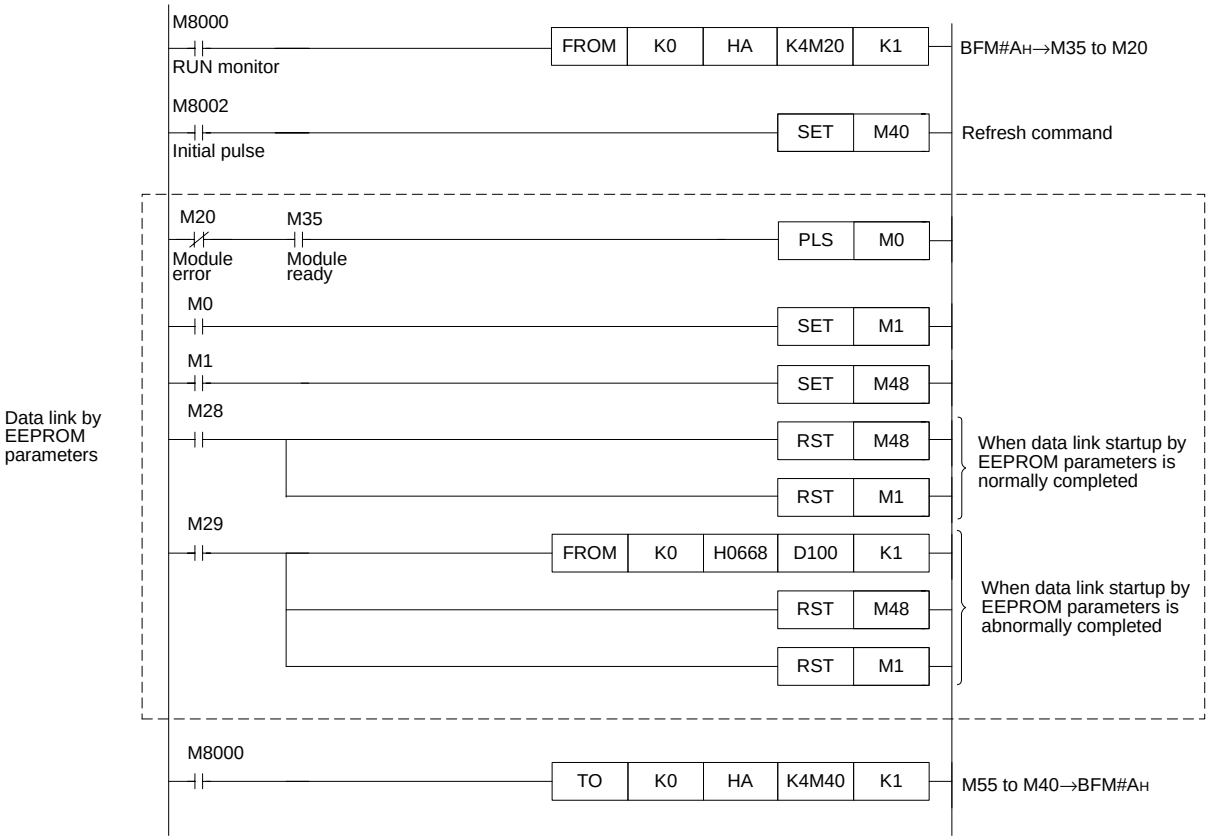
In the program below, data link automatically starts when the PLC starts to run.

[For debugging]




M8002
Initial pulse
SET M40
Refresh command
Data link by buffer memory parameters
M20
Module error
M35
Module ready
PLS M2
M2
SET M3
M3
SET M46
M26
RST M46
RST M3
When data link startup by buffer memory parameters is normally completed
M27
FROM K0 H0668 D100 K1
RST M46
RST M3
When data link startup by buffer memory parameters is abnormally completed
Parameter registration to EEPROM
Registration command
M20
Module error
M35
Module ready
PLS M4
M4
SET M5
M5
SET M50
M30
RST M50
RST M5
When parameter registration to EEPROM is normally completed
M31
FROM K0 H06B9 D101 K1
RST M50
RST M5
When parameter registration to EEPROM is abnormally completed
M8000
RUN monitor
TO K0 HA K4M40 K1
M55 to M40→BFM#AH

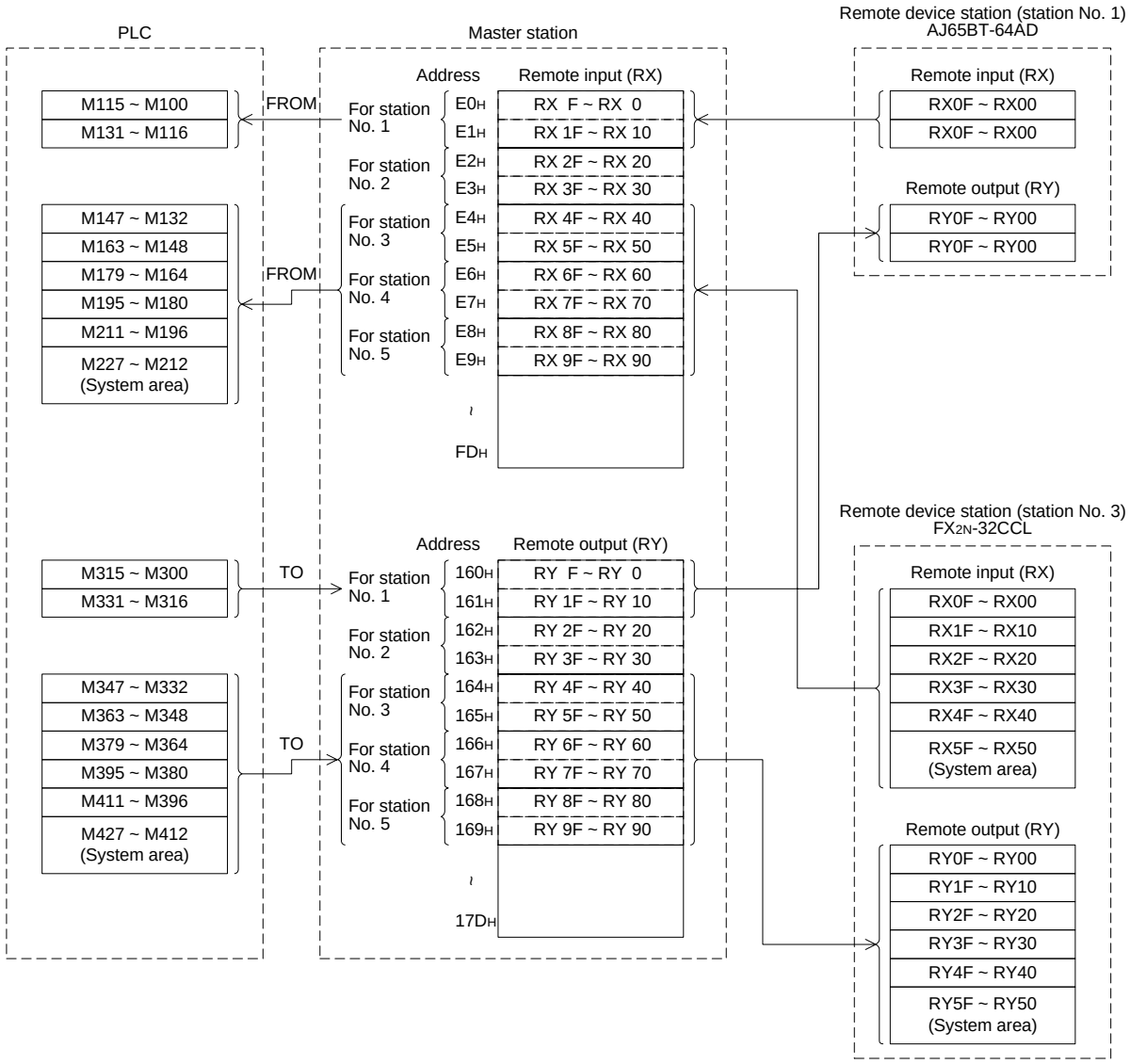
[For operation]



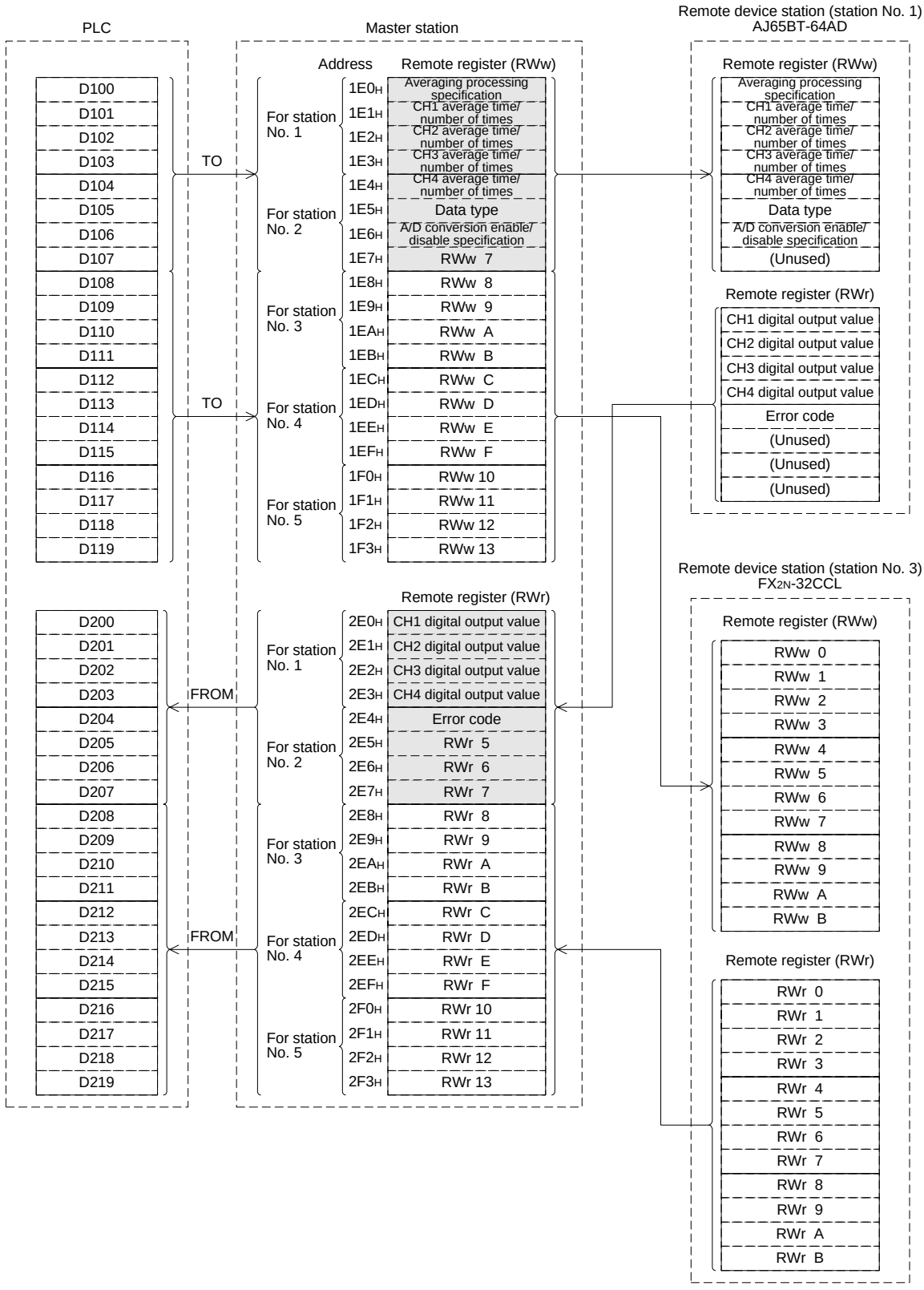
11.2.2 Program for communication

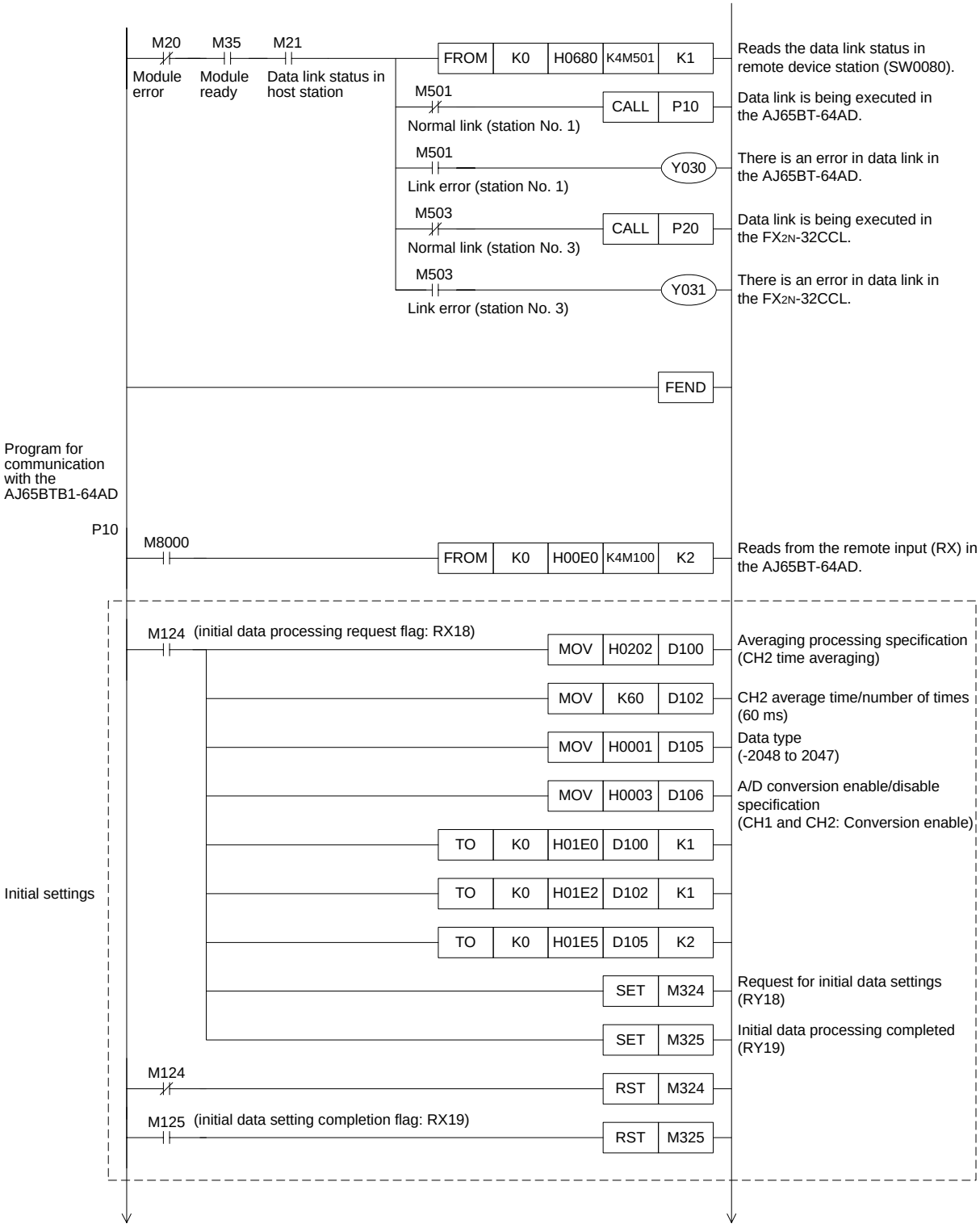
The figure below shows a program to control remote device stations.
It is supposed that the relationship among the PLC, the master station buffer memory and the remote device stations is as shown below.
For the details of remote device stations, refer to the user's manual of each module.

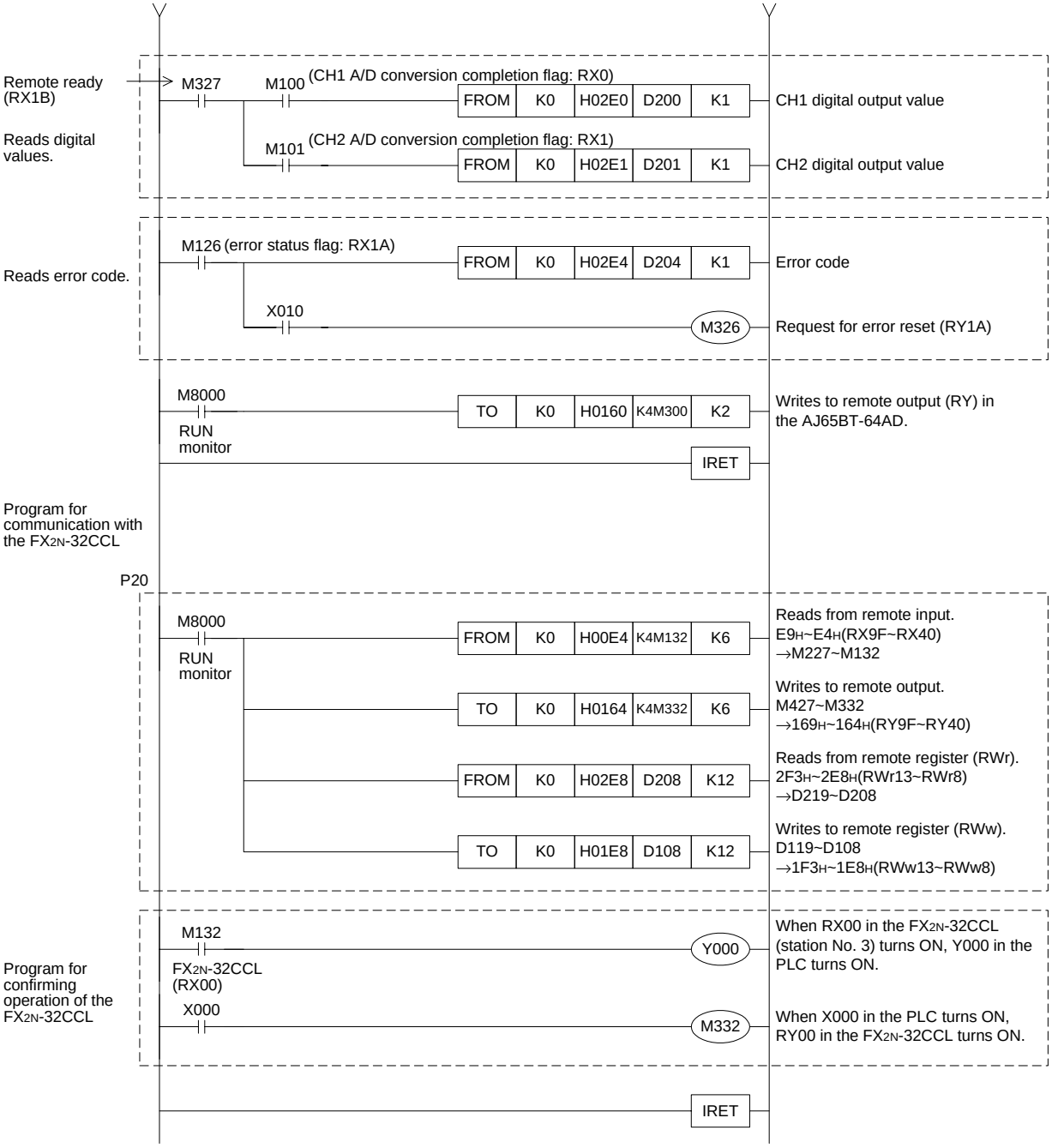
[Remote input (RX) and remote output (RY)]



[Remote register (RWw, RWr)]




M20
M35
M21
Module error
Module ready
Data link status in host station
FROM K0 H0680 K4M501 K1
Reads the data link status in remote device station (SW0080).
M501
Normal link (station No. 1)
CALL P10
Data link is being executed in the AJ65BT-64AD.
M501
Link error (station No. 1)
Y030
There is an error in data link in the AJ65BT-64AD.
M503
Normal link (station No. 3)
CALL P20
Data link is being executed in the FX2N-32CCL.
M503
Link error (station No. 3)
Y031
There is an error in data link in the FX2N-32CCL.
FEND
Program for communication with the AJ65BTB1-64AD
P10
M8000
FROM K0 H00E0 K4M100 K2
Reads from the remote input (RX) in the AJ65BT-64AD.
M124 (initial data processing request flag: RX18)
MOV H0202 D100
Averaging processing specification (CH2 time averaging)
MOV K60 D102
CH2 average time/number of times (60 ms)
MOV H0001 D105
Data type (-2048 to 2047)
MOV H0003 D106
A/D conversion enable/disable specification (CH1 and CH2: Conversion enable)
TO K0 H01E0 D100 K1
TO K0 H01E2 D102 K1
TO K0 H01E5 D105 K2
Initial settings
SET M324
Request for initial data settings (RY18)
SET M325
Initial data processing completed (RY19)
M124
RST M324
M125 (initial data setting completion flag: RX19)
RST M325


Remote ready (RX1B)
M327
M100 (CH1 A/D conversion completion flag: RX0)
FROM K0 H02E0 D200 K1
CH1 digital output value
Reads digital values.
M101 (CH2 A/D conversion completion flag: RX1)
FROM K0 H02E1 D201 K1
CH2 digital output value
Reads error code.
M126 (error status flag: RX1A)
FROM K0 H02E4 D204 K1
Error code
X010
M326
Request for error reset (RY1A)
M8000
RUN monitor
TO K0 H0160 K4M300 K2
Writes to remote output (RY) in the AJ65BT-64AD.
IRET
Program for communication with the FX2N-32CCL
P20
M8000
RUN monitor
FROM K0 H00E4 K4M132 K6
Reads from remote input.
E9H~E4H(RX9F~RX40)
→M227~M132
TO K0 H0164 K4M332 K6
Writes to remote output.
M427~M332
→169H~164H(RY9F~RY40)
FROM K0 H02E8 D208 K12
Reads from remote register (RWr).
2F3H~2E8H(RWr13~RWr8)
→D219~D208
TO K0 H01E8 D108 K12
Writes to remote register (RWw).
D119~D108
→1F3H~1E8H(RWw13~RWw8)
Program for confirming operation of the FX2N-32CCL
M132
FX2N-32CCL (RX00)
Y000
When RX00 in the FX2N-32CCL (station No. 3) turns ON, Y000 in the PLC turns ON.
X000
M332
When X000 in the PLC turns ON, RY00 in the FX2N-32CCL turns ON.
IRET

11.3 Execution of Data Link

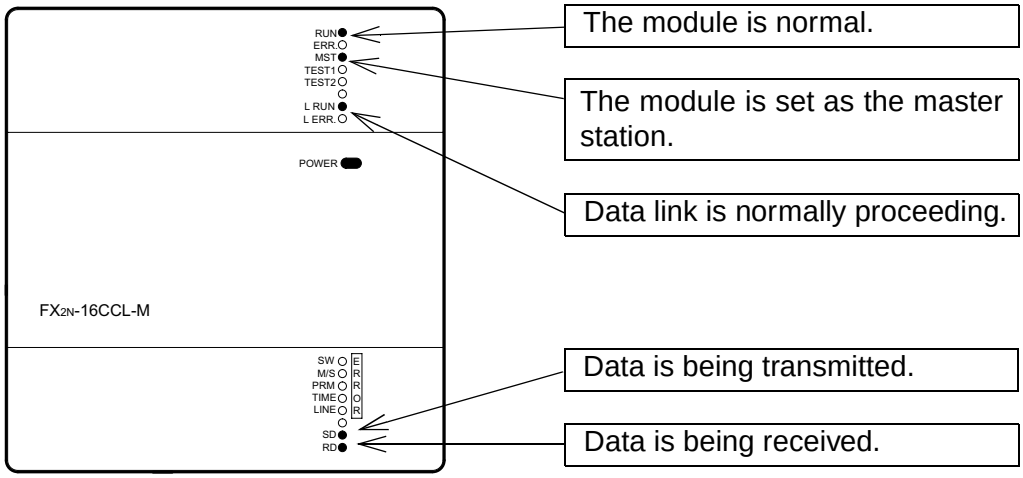
Turn on the power of the remote device stations first, turn on the power of the master station, then start the data link.

11.3.1 Confirmation of operation by LED indication

The figures below show the LED indication status in the master station and the remote device stations while the data link is proceeding normally.

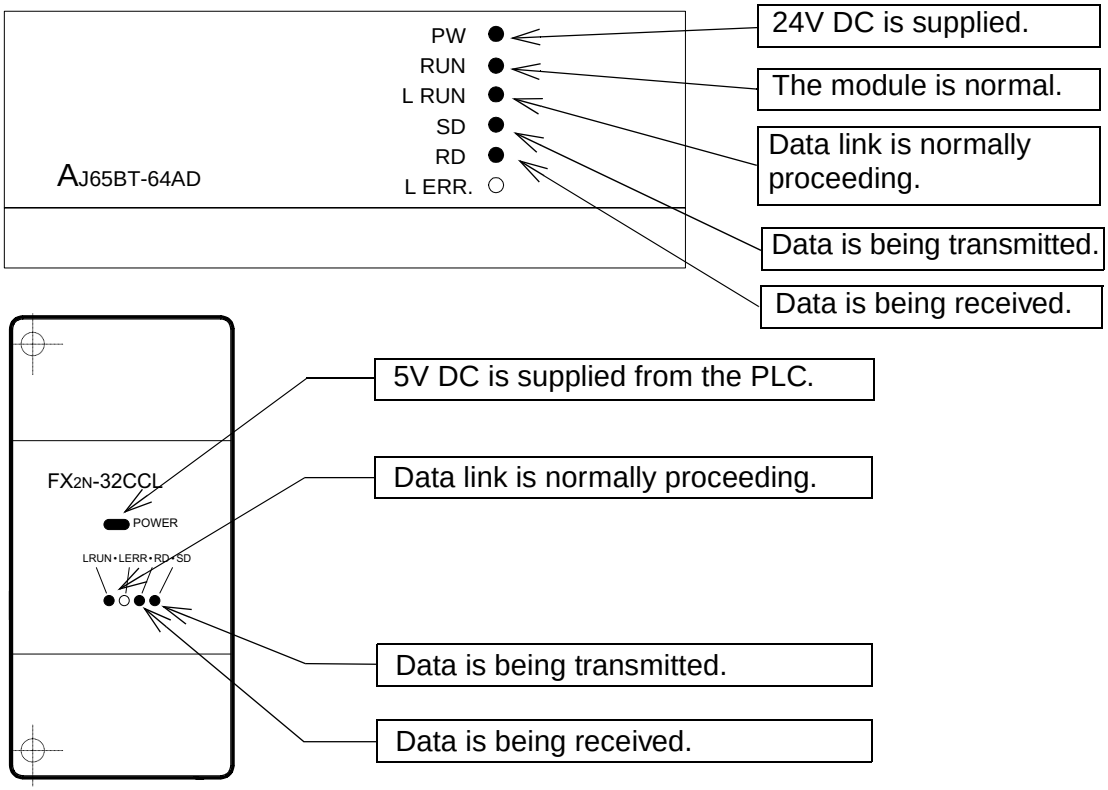
1) LED indication in the master station

Make sure that the LED indication status is as shown below.



2) LED indication in the remote device station

Make sure that the LED indication status is as shown below.



11.3.2 Confirmation of operation by program

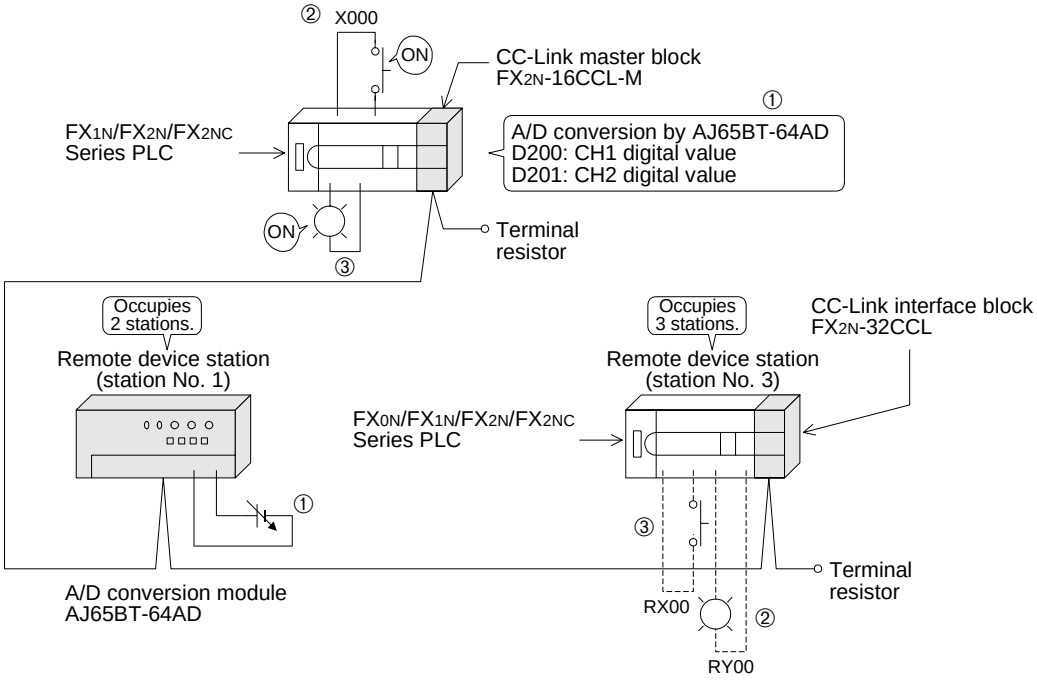
Using a sequence program, make sure that data link is proceeding normally.

① The digital values converted by the AJ65BT-64AD are stored in D200 (CH1 digital value) and D201 (CH2 digital value).

② When X000 in the PLC turns ON, RY00 in the FX2N-32CCL turns ON.

③ When RX00 in the FX2N-32CCL turns ON, Y000 (M132) in the PLC turns ON.

Point
A program for communication is required also in the PLC connected to the FX2N-32CCL. (Refer to the FX2N-32CCL User's Manual.)



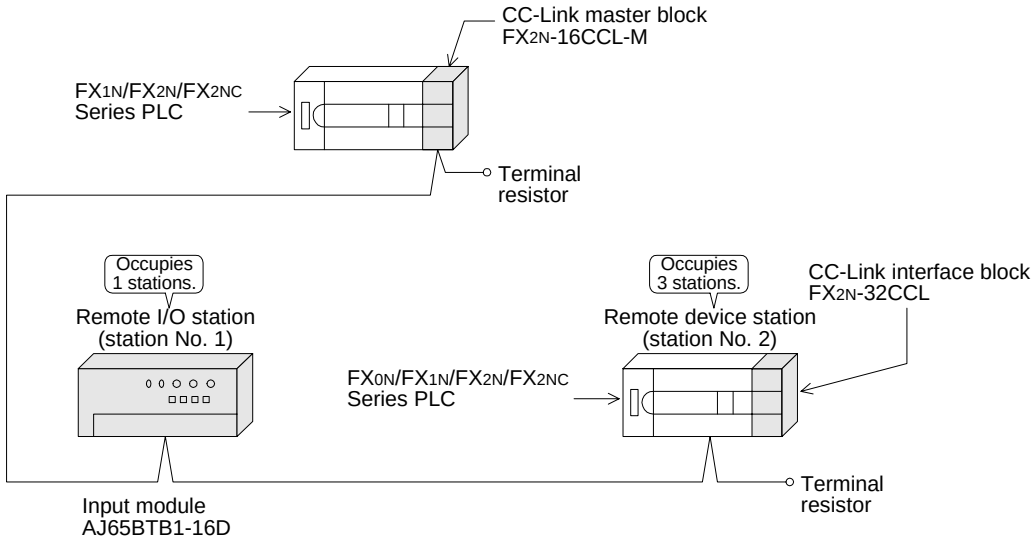
MEMO

12. Communication in Compound System

This chapter describes module setting, programming and operation confirmation in the system in which remote I/O station and remote device station exist together using a system configuration example.

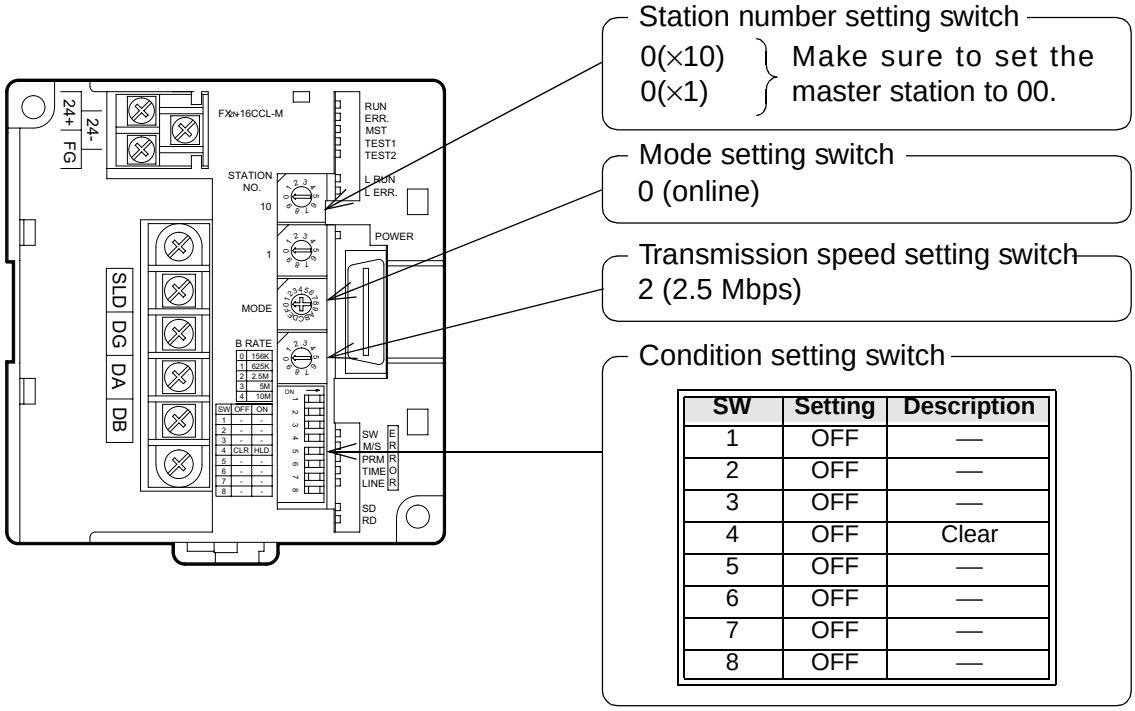
12.1 System configuration

It is supposed that one remote I/O station and one remote device station are connected in the system.



12.1.1 Setting of master station

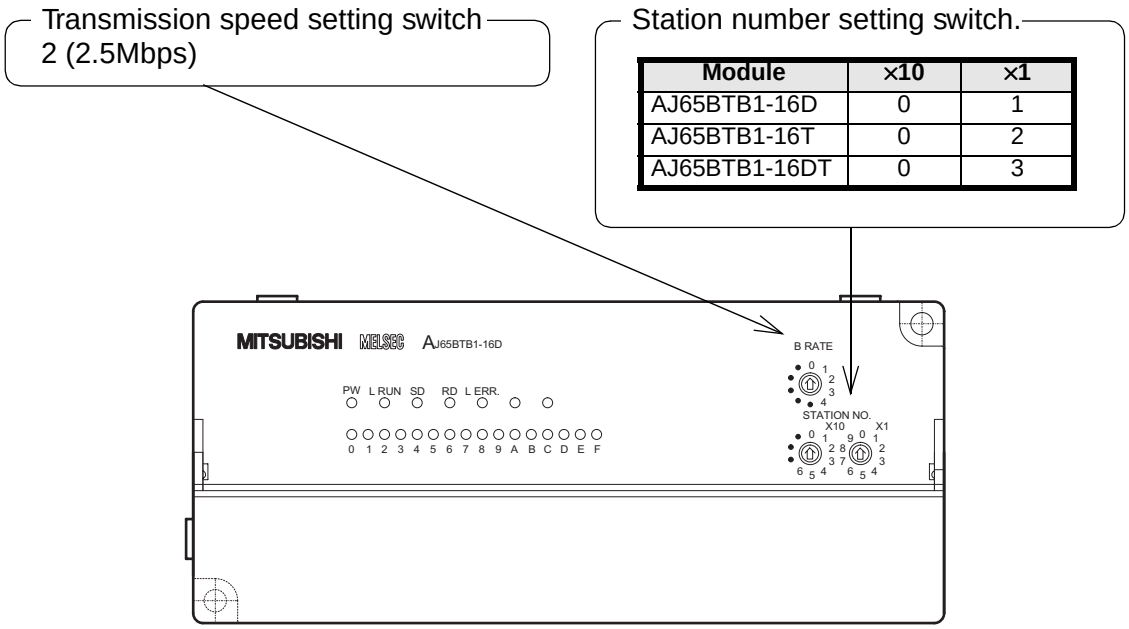
The figure below shows the setting of the switches in the master station.



SW	Setting	Description
1	OFF	—
2	OFF	—
3	OFF	—
4	OFF	Clear
5	OFF	—
6	OFF	—
7	OFF	—
8	OFF	—

12.1.2 Setting of remote I/O station

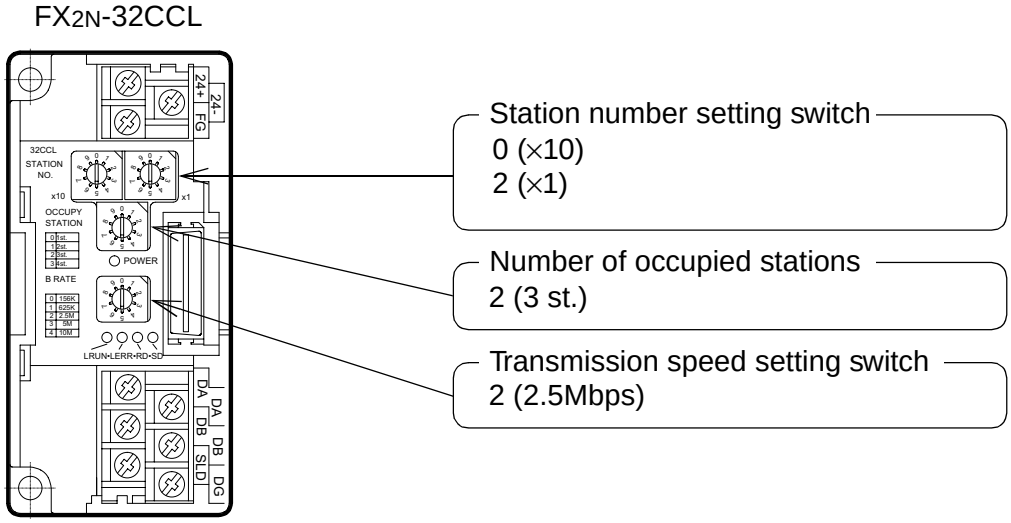
The figure below shows the setting of the switches in the remote I/O station.



Module	×10	×1
AJ65BTB1-16D	0	1
AJ65BTB1-16T	0	2
AJ65BTB1-16DT	0	3

12.1.3 Setting of remote device station

The figure below shows the setting of the switches in the remote device station.

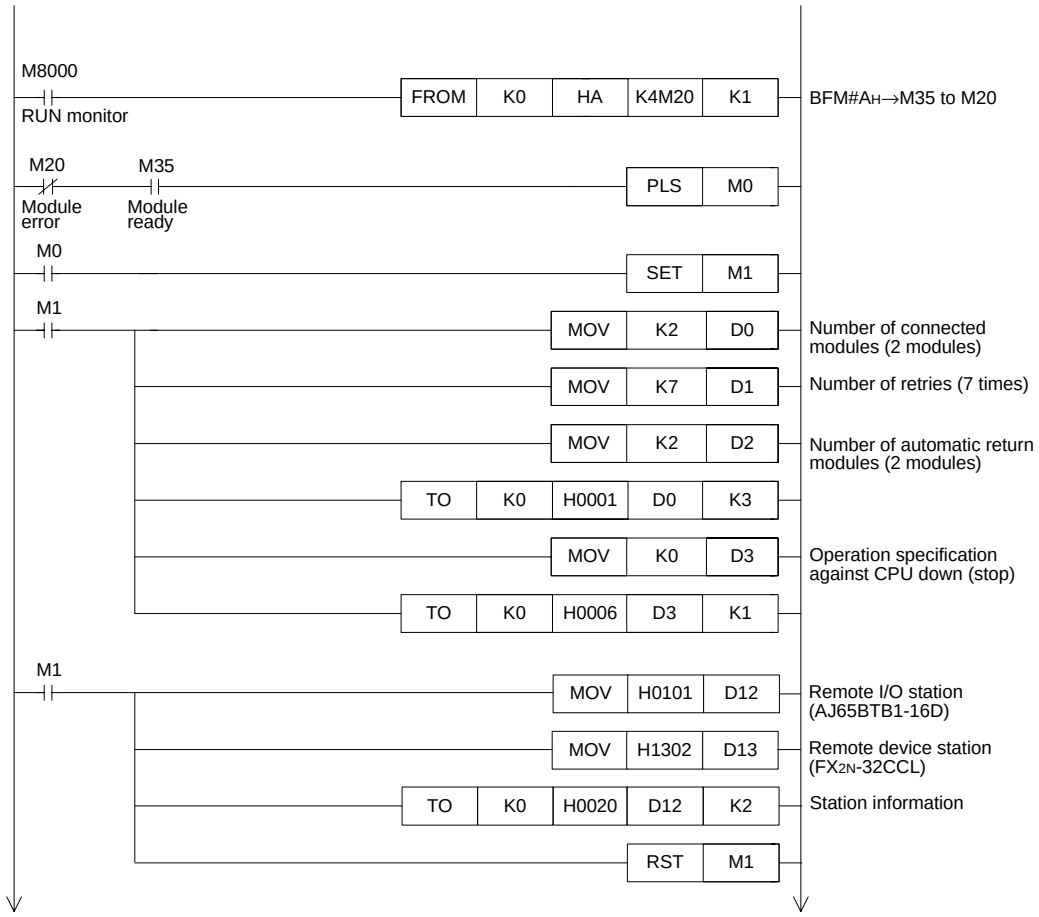


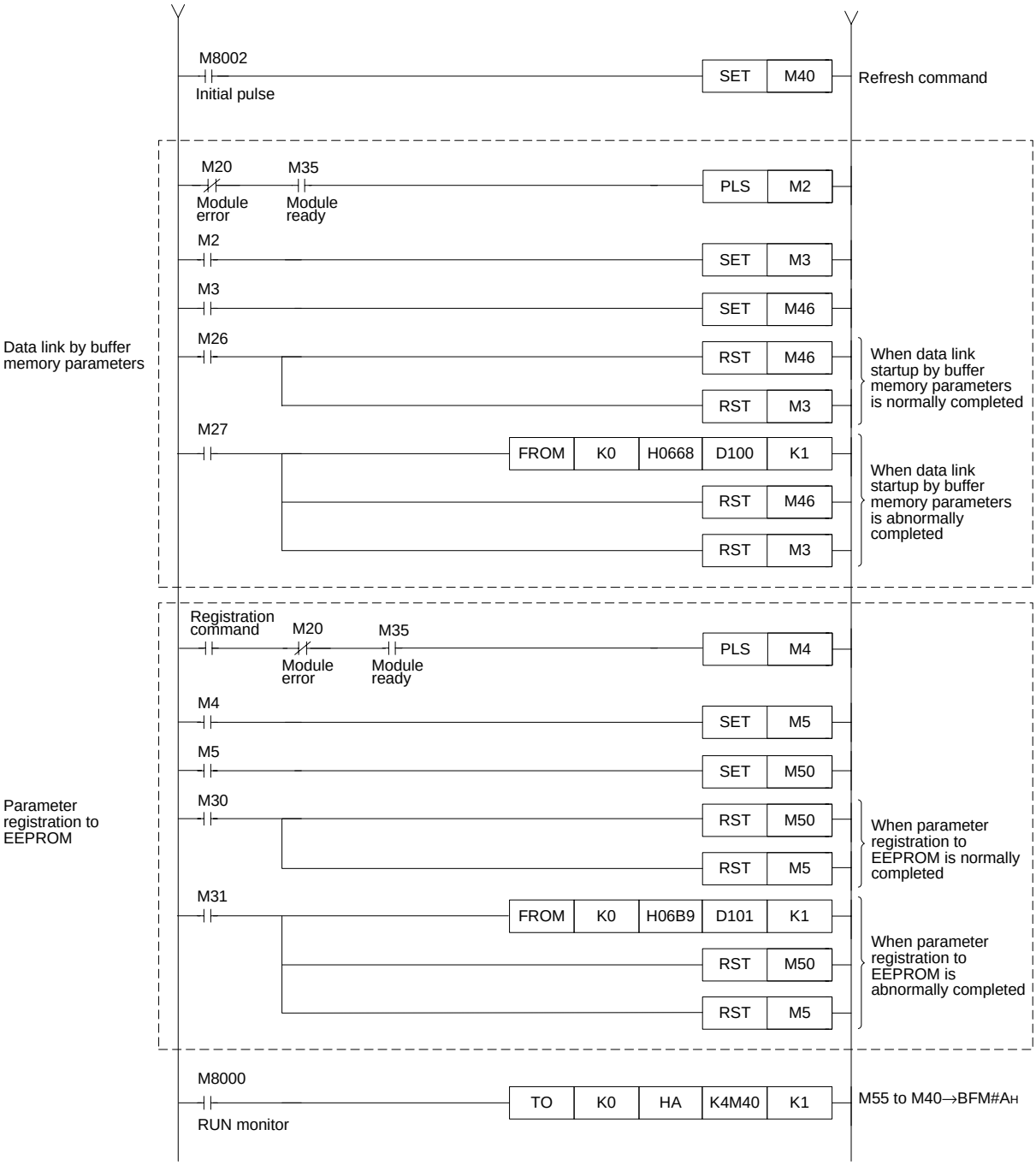
12.2 Creating a Program

12.2.1 Program for parameters

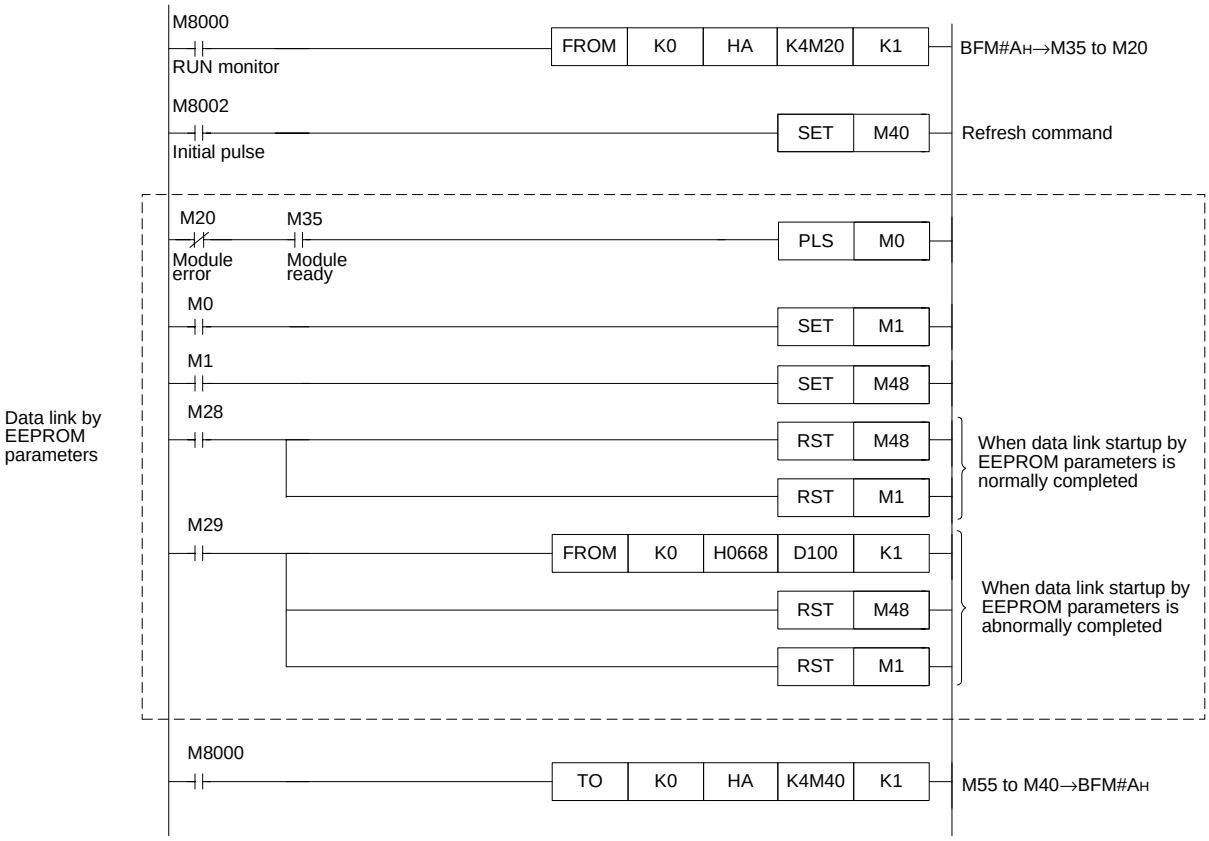
In the program below, data link automatically starts when the PLC starts to run.

[For debugging]




M8002
Initial pulse
SET M40
Refresh command
Data link by buffer memory parameters
M20
Module error
M35
Module ready
PLS M2
M2
SET M3
M3
SET M46
M26
RST M46
RST M3
When data link startup by buffer memory parameters is normally completed
M27
FROM K0 H0668 D100 K1
RST M46
RST M3
When data link startup by buffer memory parameters is abnormally completed
Parameter registration to EEPROM
Registration command
M20
Module error
M35
Module ready
PLS M4
M4
SET M5
M5
SET M50
M30
RST M50
RST M5
When parameter registration to EEPROM is normally completed
M31
FROM K0 H06B9 D101 K1
RST M50
RST M5
When parameter registration to EEPROM is abnormally completed
M8000
RUN monitor
TO K0 HA K4M40 K1
M55 to M40→BFM#AH

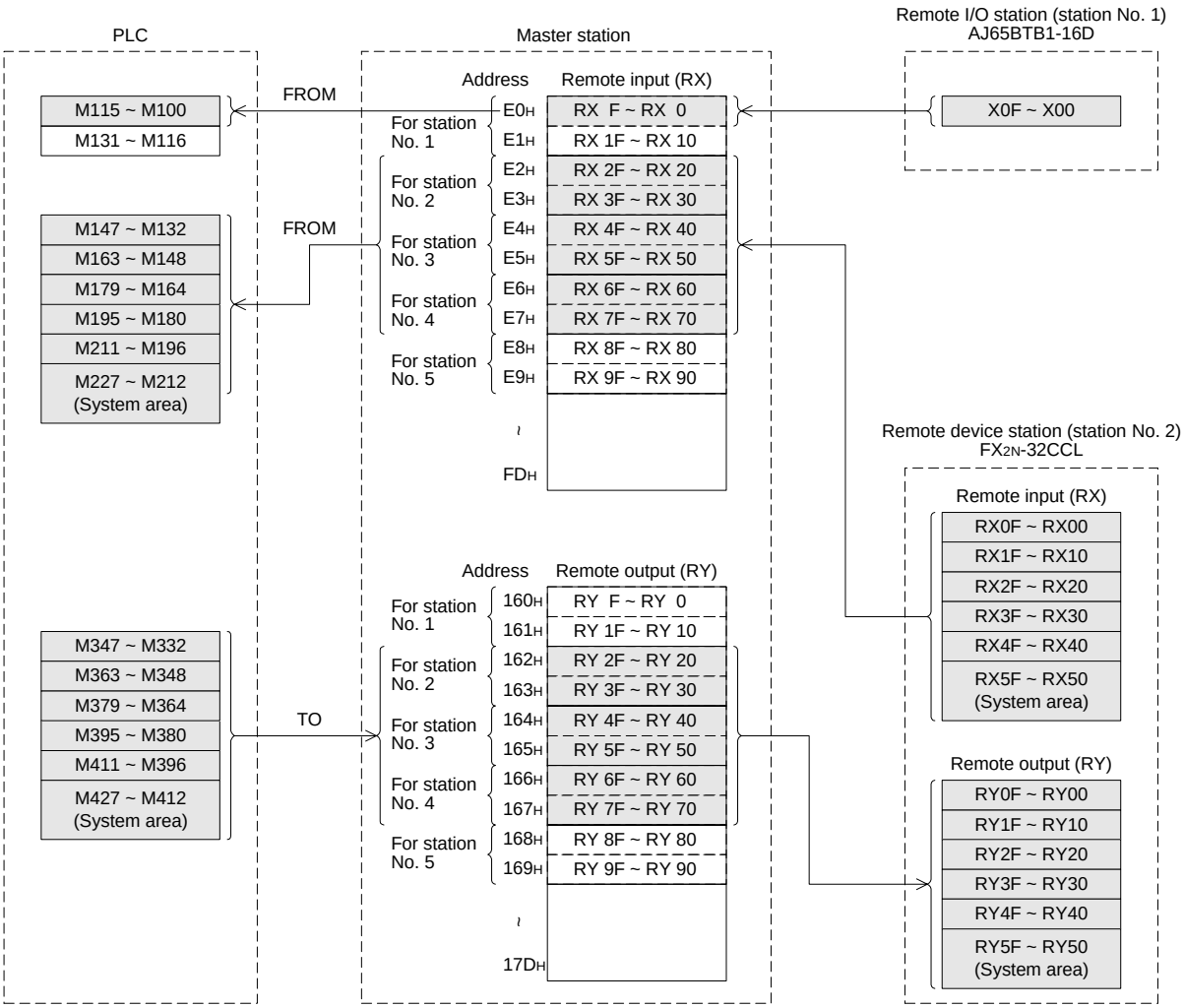
[For operation]



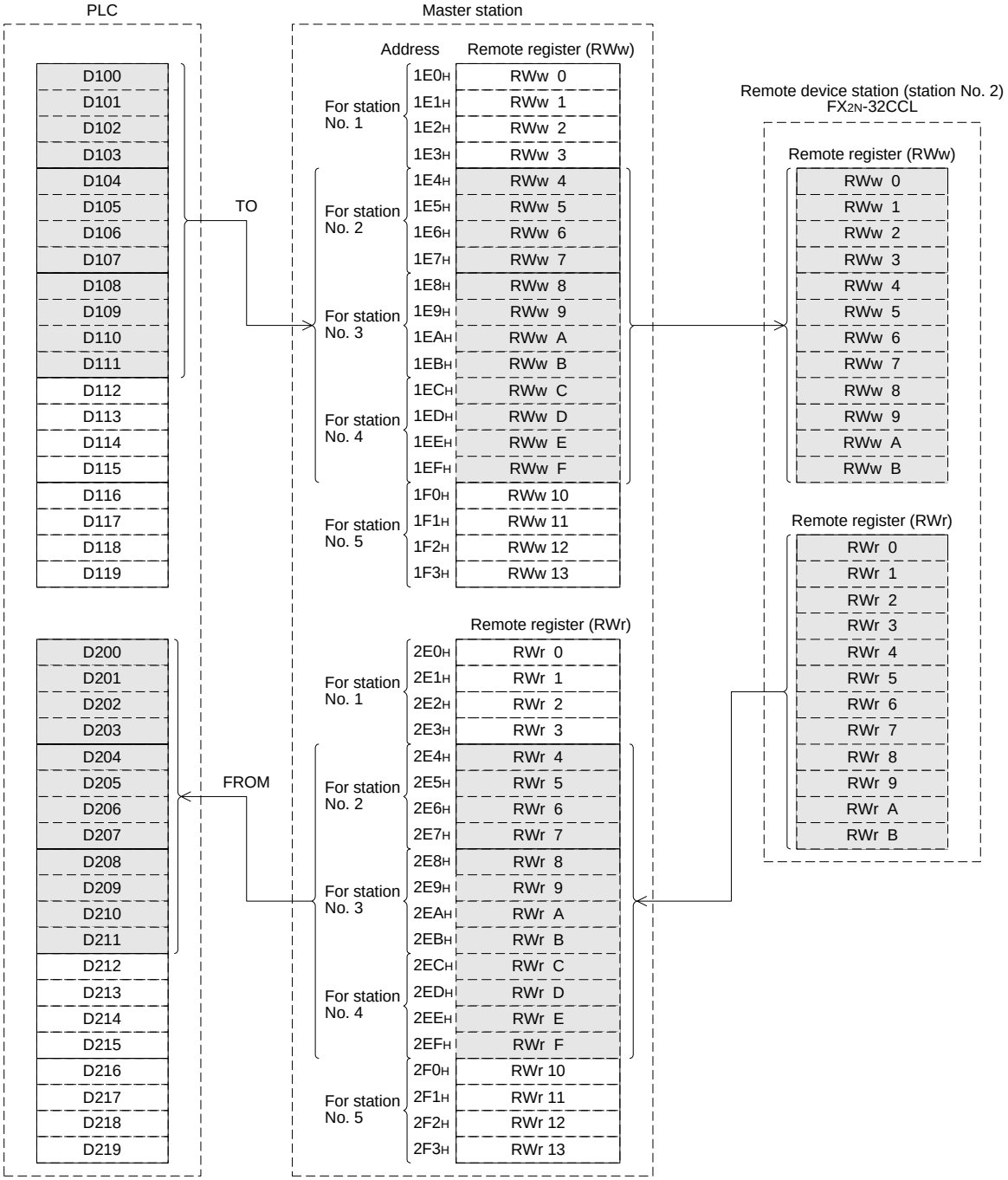
12.2.2 Program for communication

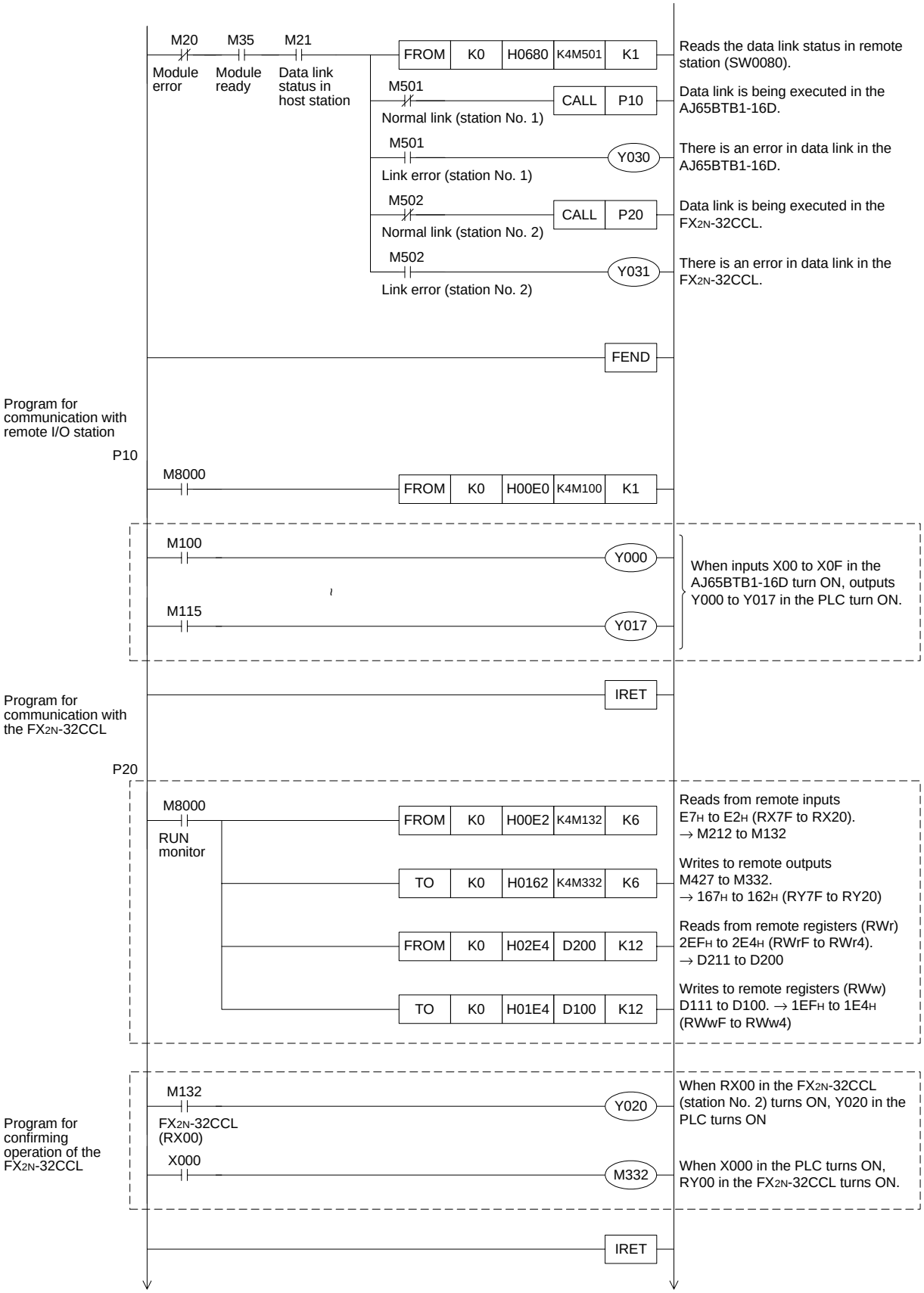
The figure below shows a program to control the remote I/O station and the remote device station.
It is supposed that the relationship among the PLC, the master station buffer memory, the remote I/O station and the remote device station is as shown below.
For the details of remote device station, refer to the user's manual of the module.

[Remote input (RX) and remote output (RY)]



[Remote register (RWw, RWr)




M20
Module error
M35
Module ready
M21
Data link status in host station
FROM K0 H0680 K4M501 K1
Reads the data link status in remote station (SW0080).
M501
Normal link (station No. 1)
CALL P10
Data link is being executed in the AJ65BTB1-16D.
M501
Link error (station No. 1)
Y030
There is an error in data link in the AJ65BTB1-16D.
M502
Normal link (station No. 2)
CALL P20
Data link is being executed in the FX2N-32CCL.
M502
Link error (station No. 2)
Y031
There is an error in data link in the FX2N-32CCL.
FEND
Program for communication with remote I/O station
P10
M8000
FROM K0 H00E0 K4M100 K1
M100
Y000
When inputs X00 to X0F in the AJ65BTB1-16D turn ON, outputs Y000 to Y017 in the PLC turn ON.
M115
Y017
IRET
Program for communication with the FX2N-32CCL
P20
M8000
RUN monitor
FROM K0 H00E2 K4M132 K6
Reads from remote inputs E7H to E2H (RX7F to RX20). → M212 to M132
TO K0 H0162 K4M332 K6
Writes to remote outputs M427 to M332. → 167H to 162H (RY7F to RY20)
FROM K0 H02E4 D200 K12
Reads from remote registers (RWr) 2EFH to 2E4H (RWrF to RWr4). → D211 to D200
TO K0 H01E4 D100 K12
Writes to remote registers (RWw) D111 to D100. → 1EFH to 1E4H (RWwF to RWw4)
Program for confirming operation of the FX2N-32CCL
M132
FX2N-32CCL (RX00)
Y020
When RX00 in the FX2N-32CCL (station No. 2) turns ON, Y020 in the PLC turns ON
X000
M332
When X000 in the PLC turns ON, RY00 in the FX2N-32CCL turns ON.
IRET

12.3 Execution of Data Link

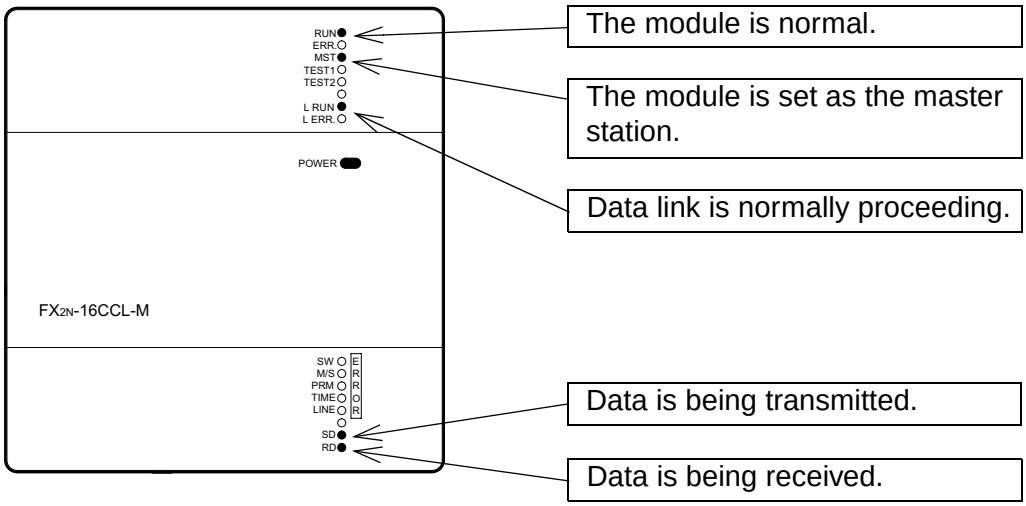
Turn on the power of the modules in the order "remote I/O station → remote device station → master station", then start the data link.

12.3.1 Confirmation of operation by LED indication

The figures below show the LED indication status in the master station, the remote I/O station and the remote device station while the data link is normally proceeding.

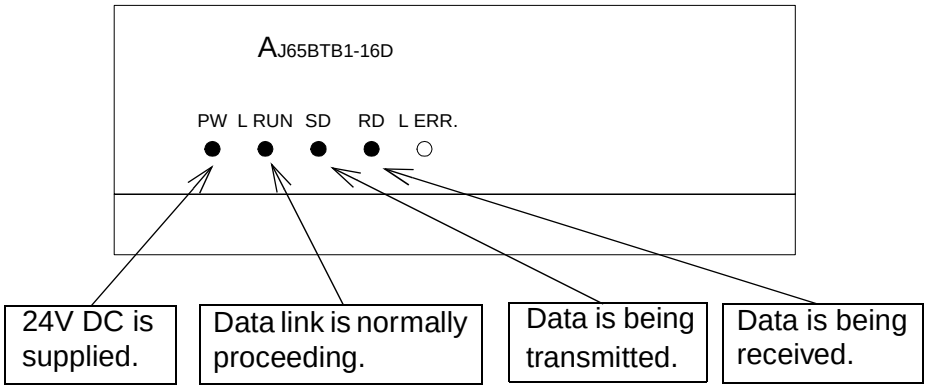
1) LED indication in the master station

Make sure that the LED indication status is as shown below.



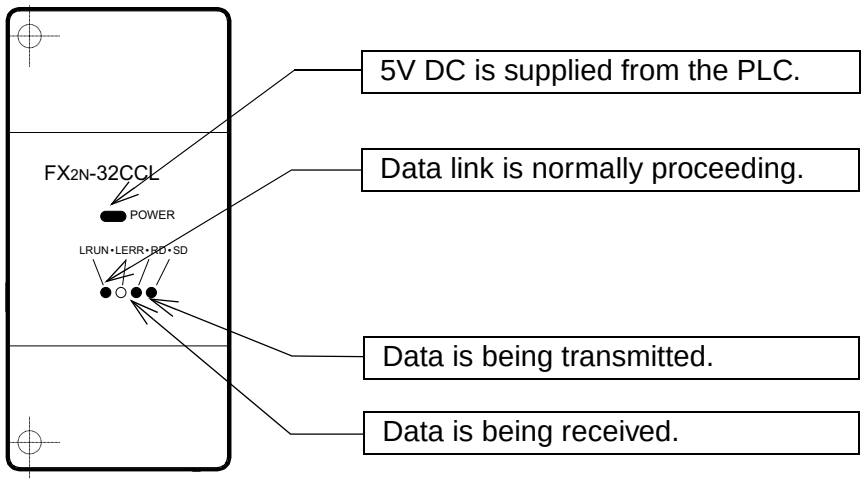
2) LED indication in the remote I/O station

Make sure that the LED indication status is as shown below.



3) LED indication in the remote device station

Make sure that the LED indication status is as shown below.



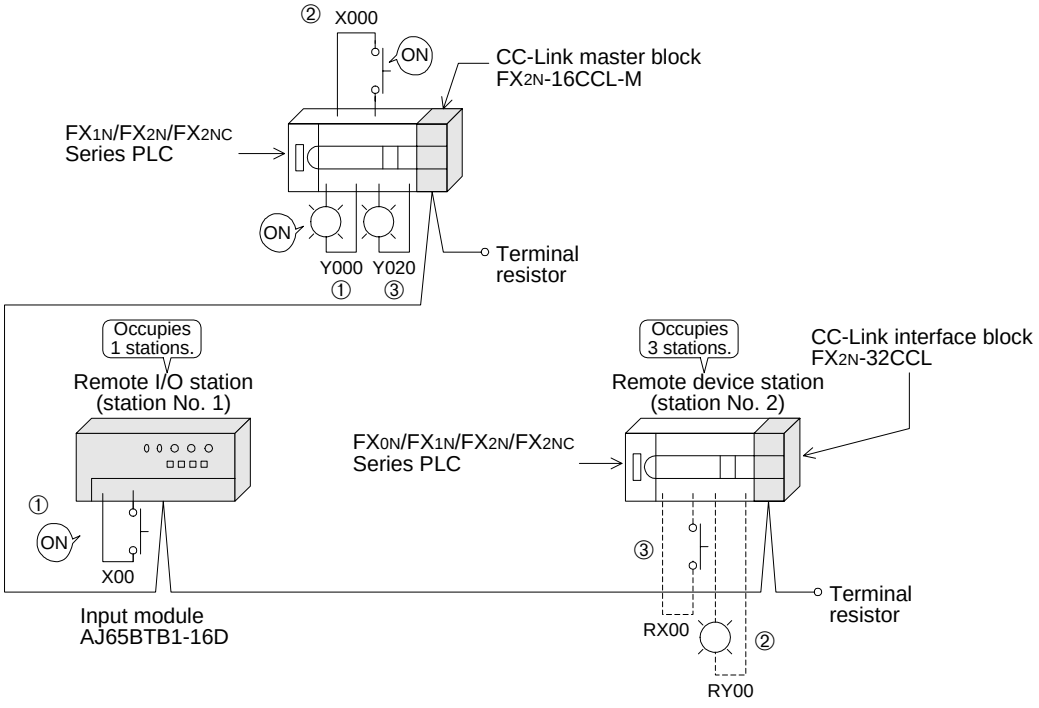
12.3.2 Confirmation of operation by program

Using a sequence program, make sure that data link is normally proceeding.

① When X000 in the remote I/O station is set to ON, Y000 in the PLC turns ON.
② When X000 in the PLC turns ON, RY00 in the FX2N-32CCL turns ON.
③ When RX00 in the FX2N-32CCL turns ON, Y020 (M132) in the PLC turns ON.

.

Point
A program for communication is required also in the PLC connected to the FX2N-32CCL. (Refer to the FX2N-32CCL User's Manual.)



13. Troubleshooting

STARTING AND MAINTENANCE PRECAUTIONS

- Do not touch the terminals while the power is supplied.
  Otherwise, electrical shock or malfunction may be caused.
- Turn off the power first, then clean the module or tightening the screws.
  Cleaning or tightening in the power ON status may cause electrical shock.
- Before executing program changes, forcible output, RUN operation or STOP operation, thoroughly read the manual and sufficiently confirm safety.
  Incorrect operation may damage the module or cause an accident.

STARTING AND MAINTENANCE PRECAUTIONS

- Do not disassemble or rebuild the module.
  It may cause failures, malfunction or fire.
- Before connecting or disconnecting a connection cable such as an extension cable, turn off the power.
  Otherwise, the module may fail or malfunction.

DISPOSAL PRECAUTIONS

- When disposing of the module, handle it as industrial waste.

13.1 Verification when Trouble Occurs

The table below shows the details to be checked and corrective actions for each trouble occurrence.

Table 13.1:

Trouble description	Details to be checked	Confirmation method
Data link is disabled in the entire system.	Are any cables broken?	• Check the cable status visually or by the line test.
	Are terminal resistors properly connected to stations at the both ends?	Connect terminal resistors offered as accessories of the master module to stations at the both ends.
	Has an error occurred in the master station?	Check the error code in the PLC, and take the corrective action.
	Are parameters set in the master station?	Confirm the contents of the parameters.
	Is the write request for data link startup (BFM#AH b6 or b8) ON?	Confirm the sequence program.
	Has an error occurred in the master station?	Confirm the following: • Parameter status in the host station (SW0068) • Switch setting status (SW006A) • Loading status (SW0069) • Flashing of the ERR LED in the master station (Section 13.2.)
Inputs from a remote I/O station cannot be received.	Is the remote I/O station executing data link?	Check the following: • LED indication in the module • Communication status in the master station with other stations (SW0080)
	Is data read from the correct address of remote input RX (buffer memory)?	Confirm the sequence program.
	Is the station specified as reserved one?	Confirm the contents of the parameters.
	Does the station number overlap?	Confirm the station number
	Is the connection/setting beyond the specification of the master station?	Confirm the contents of the BFM#1DH. (Section 4.4.5)
Outputs are disabled in a remote I/O station.	Is the remote I/O station executing data link?	Check the following: • LED indication in the module • Communication status in the master station with other stations (SW0080 to SW0083)
	Is the refresh command output (BFM#AH b0) ON in the master station?	Confirm the sequence program.
	Is data written to the correct address of remote output RY (buffer memory)?	Confirm the sequence program.
	Is the station specified as reserved one?	Confirm the contents of the parameters.
	Does the station number overlap?	Confirm the station number
	Is the connection/setting beyond the specification of the master station?	Confirm the contents of the BFM#1DH. (Section 4.4.5)

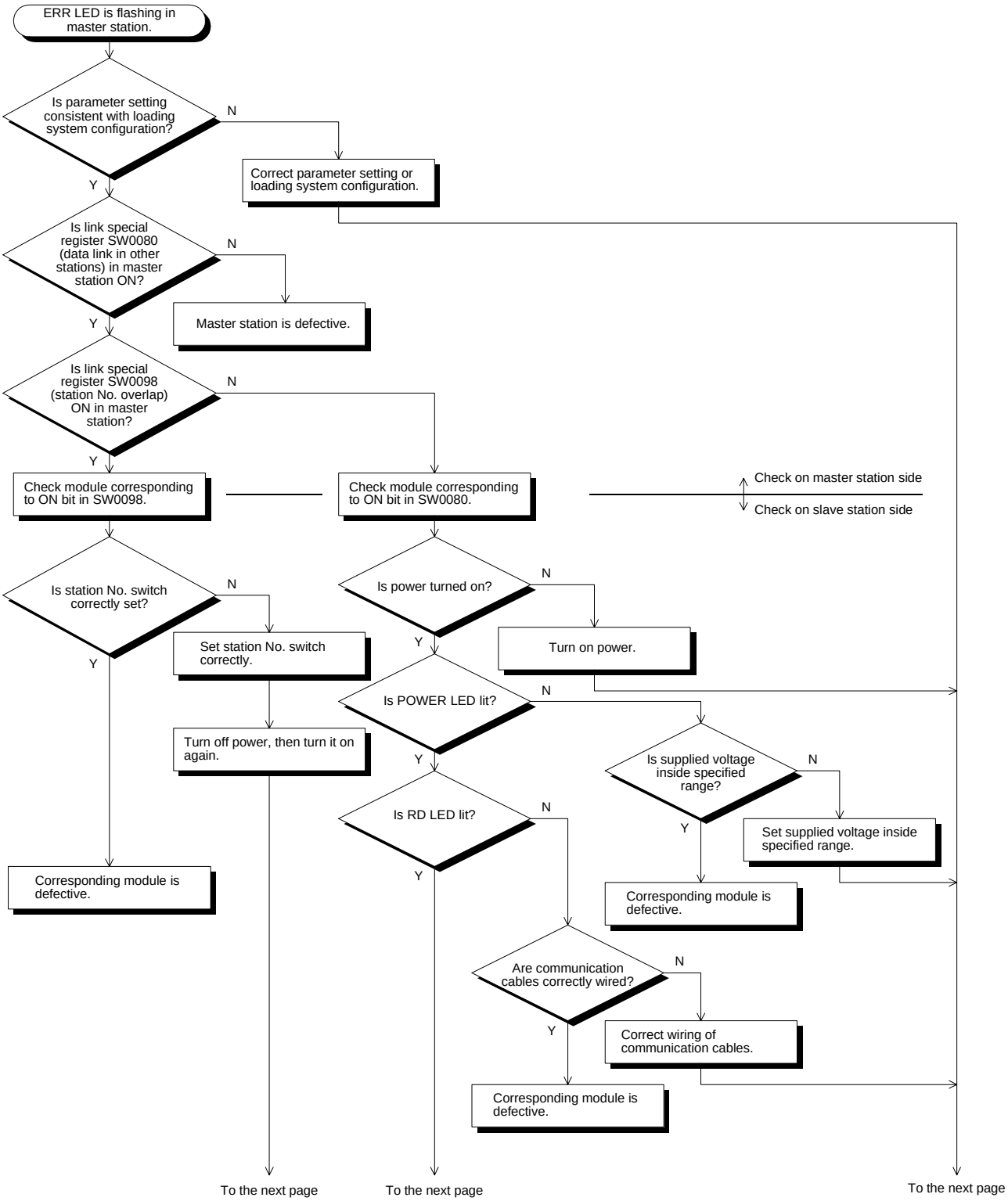
Things to do after checking the communication status with other stations (SW0080)

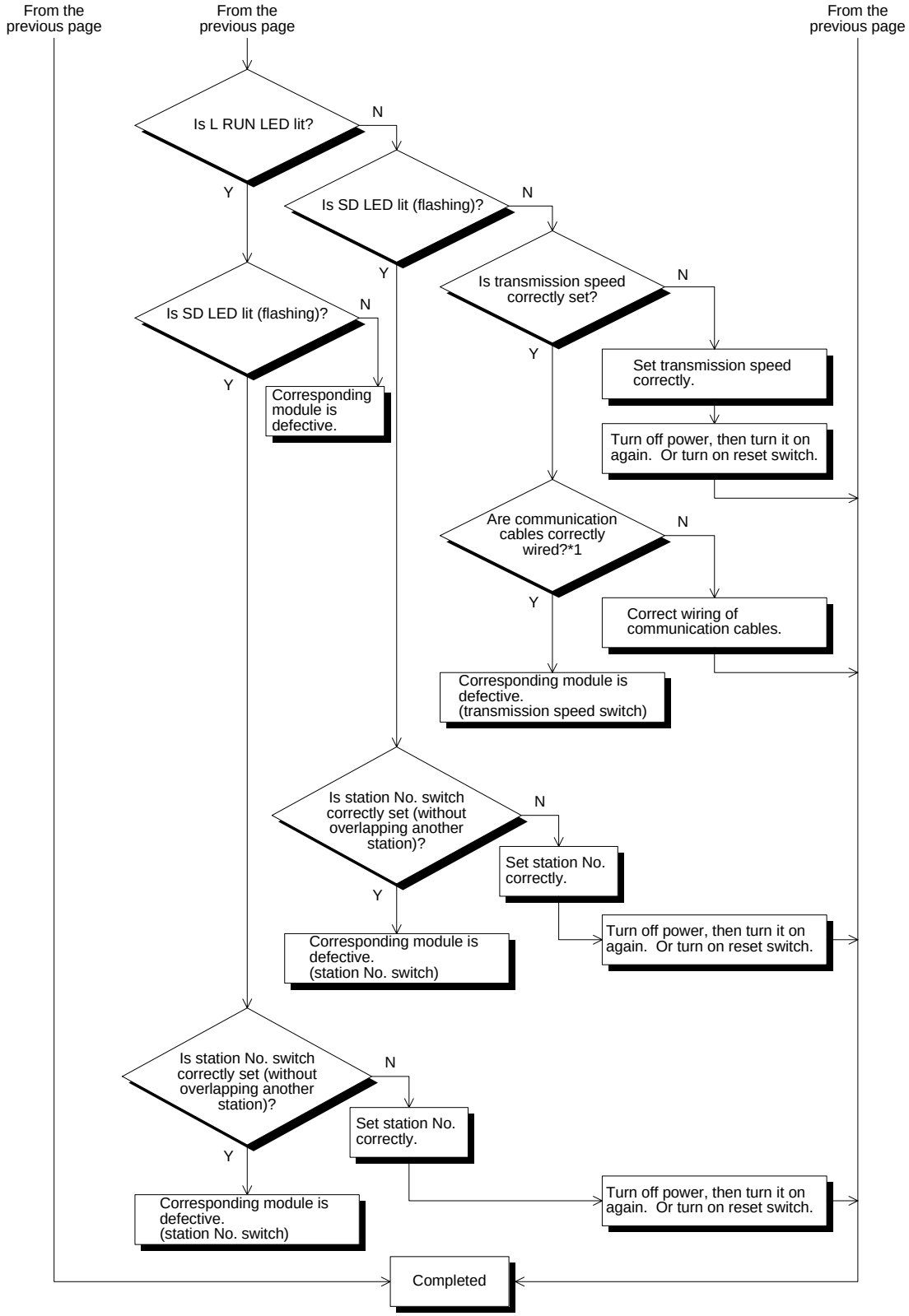
1) Read the contents of the BFM#1DH, and check whether access outside the allowable range is not executed. (Refer to Section 4.4.5.)
2) Check whether the cable wiring is correct.
3) Check whether terminal resistors are correctly connected to modules at the both ends.
4) Check whether communication is enabled when the transmission speed is made slower.
5) Check whether the settings are consistent between the parameters and the startup station.
6) Check whether the station numbers overlap.
7) Replace a faulty module with a correctly operating one, and check whether the single module is defective.

Trouble description	Details to be checked	Confirmation method
Remote input (RX) in a remote device station cannot be received.	Is the remote device station executing data link?	Check the following: • LED indication in the module • Communication status in the master station with other stations (SW0080)
	Is data read from the correct address of remote input RX (buffer memory)?	Confirm the sequence program.
	Is the station specified as reserved one?	Confirm the contents of the parameters.
	Does the station number overlap?	Confirm the station number
	Is the connection/setting beyond the specification of the master station?	Confirm the contents of the BFM#1DH. (Section 4.4.5)
Remote output (RY) in a remote device station cannot be set to ON or OFF.	Is the remote device station executing data link?	Check the following: • LED indication in the module • Communication status in the master station with other stations (SW0080)
	Is the refresh command output (BFM#AF b0) ON in the master station?	Confirm the sequence program.
	Is data written to the correct address of remote output RY (buffer memory)?	Confirm the sequence program.
	Is the station specified as reserved one?	Confirm the contents of the parameters.
	Does the station number overlap?	Confirm the station number
	Is the connection/setting beyond the specification of the master station?	Confirm the contents of the BFM#1DH. (Section 4.4.5)
Data in remote register (RWr) in a remote device station cannot be received.	Is the remote device station executing data link?	Check the following: • LED indication in the module • Communication status in the master station with other stations (SW0080)
	Is data read from the correct address of remote register RWr (buffer memory)?	Confirm the sequence program.
	Is the station specified as reserved one?	Confirm the contents of the parameters.
	Does the station number overlap?	Confirm the station number
	Is the connection/setting beyond the specification of the master station?	Confirm the contents of the BFM#1DH. (Section 4.4.5)
Data cannot be written to remote register (RWw) in a remote device station.	Is the remote device station executing data link?	Check the following: • LED indication in the module • Communication status in the master station with other stations (SW0080)
	Is data written to the correct address of remote register RWw (buffer memory)?	Confirm the sequence program.
	Is the station specified as reserved one?	Confirm the contents of the parameters.
	Does the station number overlap?	Confirm the station number
	Is the connection/setting beyond the specification of the master station?	Confirm the contents of the BFM#1DH. (Section 4.4.5)

Trouble description	Details to be checked	Confirmation method
Data link cannot be stopped.	Is the data link stop (SB0002) ON?	Confirm the sequence program.
	Has an error occurred?	Check the data link stop result (SW0045).
Data link cannot be restarted.	Is the data link stop (SB0000) ON?	Confirm the sequence program.
	Has an error occurred?	Check the data link restart result (SW0041).
Parameters cannot be registered to the EEPROM.	Is the write request for parameter registration to EEPROM (BFM# AH b10) ON?	Confirm the sequence program.
	Has an error occurred?	Check the EEPROM registration status (SW00B9).
A remote station cannot start up.	Are the settings consistent between the station information (parameter) and the remote station?	Confirm the contents of the parameters.
	Does the station number overlap with another module?	Check the station number setting switch.
Faulty stations cannot be detected.	Are stations specified as error invalid ones?	Confirm the contents of the parameters.
	Does the station number overlap?	Check the station number
Faulty stations occur depending on the transmission speed.	Can faulty stations be detected by the communication status in other stations (SW0080)?	• Check the switch settings in the faulty station. • Check whether the cable wiring is correct. • Check whether the cable shield is grounded.
	Is normal communication established when the transmission speed is slowed (to 156 kbps, for example)?	

13.2 Troubleshooting when ERR LED is Flashing in Master Station





*1 Check for short circuit, inverse connection and wire breakage. Check the terminal resistors, the FG connection, the total extension distance and the station-to-station distance.

13.3 Error Codes

The table below shows the error codes stored in the link special register (SW).

Table 13.2:

Error code (hex.)	Description	Cause of error (details)	Corrective action
B110	Message receive disabled	A line error has occurred.	Check the line.
B111	Message data receive order error	A line error has occurred.	Check the line.
B112	Message data length error	A line error has occurred.	Check the line.
B113	Message data identification error	A line error has occurred.	Check the line.
B114	Link error	A line error has occurred.	Check the line.
B115	Link error	A line error has occurred.	Check the line.
B116	Head bit error	A line error has occurred.	Check the line.
B301	Request for processing during link stop	The request for line test was given while link was stopped.	Execute the line test while link is executed.
B302	Specified station number setting error	When the request for temporary error invalid station or the request for cancel of temporary error invalid station was given, the specified station number was beyond the maximum communication station number	Specify a station number not more than the maximum communication station number
B303	Specified station number no-setting error	When the request for temporary error invalid station or the request for cancel of temporary error invalid station was given, the station number was not specified.	Specify a station number (SW0003, SW0004).
B306	Specified station setting error	When the request for temporary error invalid station or the request for cancel of temporary error invalid station was given, a head station was not specified.	Specify a head station in giving the request for temporary error invalid station or the request for cancel of temporary error invalid station.
B307	Data link error in all stations	When the following request was given, there was data link error in all stations. • SB0000 (data link restart) • SB0002 (data link stop)	Wait until the data link becomes normal, then give the request again.
B308	Station number setting error	The station number of a slave station is not set inside the range from 1 to 64. (In the FX2N-16CCL-M, available slave station numbers are from 1 to 15.)	Set a station number inside the specification range (1 to 15) of the FX Series master station.
B309	Station number overlap error	In connected modules, a station number overlaps (including the number of occupied stations, excluding overlap of a head station number)	Check the station numbers of the modules.

Table 13.2:

Error code (hex.)	Description	Cause of error (details)	Corrective action
B30A	Loading/ parameter consistency error	The station type is different between the module and the parameter.	Set the parameter correctly.
B30B	Loading/ parameter consistency error	The loading status is not consistent with the network parameters.	Align the loading status with the network parameters.
B30D	Temporary error invalid station specification error	Before link starts up, temporary error invalid stations are specified.	Start up the data link first, then specify temporary error invalid stations.
B384	Station number setting error (parameter)	The station number in the station information (addresses 20H to 2EH) (parameter) is not set inside the range from 1H to 40H.	Set a station number inside the specification range (1H to 10H) of the FX Series master station.
B385	Total number of modules setting error (parameter)	The total number of occupied stations in the station information (addresses 20H to 2EH) (parameter) is beyond 64.	Set the parameter inside the specification range (15 or less) of the FX Series master station.
B386	Number of occupied stations setting error (parameter)	The number of occupied stations in the station information (addresses 20H to 2EH) (parameter) is set to 0 for every station.	Set the number of occupied stations inside the range from 1 to 4.
B387	Unusable area write error	Data was written to the unusable area (unused) in the buffer memory.	Do not write to the unusable area (unused) in the buffer memory.
B388	Station type setting error	The station type in the station information (addresses 20H to 2EH) (parameter) is not set inside the range from 0 to 2.	Set 0 or 1.
B389	Unusable area write error	Data was written to the unusable area (unused) in the buffer memory.	Do not write to the unusable area (unused) in the buffer memory.
B38D	Error invalid station specification error (parameter)	In the invalid station specification (address 14H) (parameter), a station number other than a module head station number or a station number not set in the parameter is set. Example of station number other than head station number: For a module occupying 4 stations (station Nos. 5 to 8), a bit not corresponding to the station No. 5 is set to ON.	Set a module head station number Do not set a station number which is not set in the parameter.

Error code (hex.)	Description	Cause of error (details)	Corrective action
B391	Number of retries setting error (parameter)	The number of retries (address 2H) (parameter) is not set inside the range from 1 to 7.	Set a value inside the range from 1 to 7.
B392	Operation against CPU down specification error (parameter)	The operation specification against CPU down (address 6H) (parameter) is not set to 0 or 1.	Set 0 or 1.
B394	Number of automatic return modules setting error (parameter)	The number of automatic return modules (address 3H) (parameter) is not set inside the range from 1 to 10.	Set a value inside the range from 1 to 10.
B396	Station number overlap error (parameter)	In the station information (addresses 20H to 2EH) (parameter), one station number is specified twice or more.	Use each station number only once.
B397	Station information setting error (parameter)	The station information (addresses 20H to 2EH) (parameter) does not satisfy the system configuration condition.	Set the parameters to satisfy the condition.
B398	Number of occupied stations setting error (parameter)	In the station information (addresses 20H to 2EH) (parameter), the number of occupied stations is not set inside the range from 1 to 4.	Set a value inside the range from 1 to 4.
B399	Number of connected modules setting error (parameter)	The number of connected modules (address 1H) (parameter) is not set inside the range from 1 to 64.	Set a value inside the specification range (1 to 15) of the FX Series master station.
B39B	Reserved station specification error (parameter)	In the reserved station specification (parameter), all stations are set as reserved ones.	Confirm the reserved station specification (parameter).

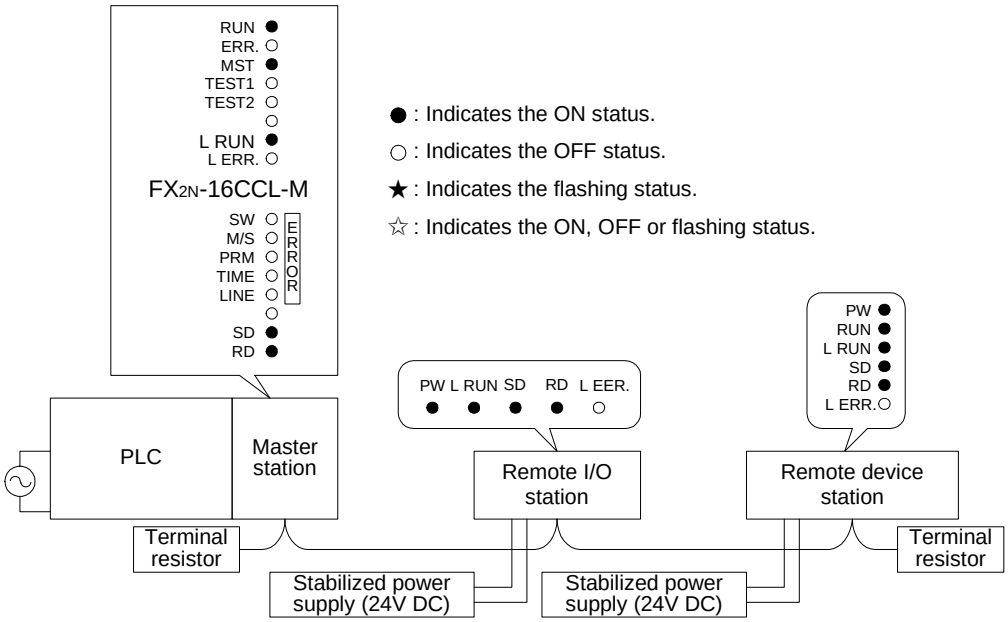
Error code (hex.)	Description	Cause of error (details)	Corrective action
B901	EEPROM error	When the write request for parameter registration to EEPROM (BFM#AH b10) was executed, the EEPROM was defective or the specified number of times of write (10,000 times) is exceeded.	Replace the module.
B902	Data link startup by EEPROM parameters error	Though parameters were not registered in the EEPROM, the write request for data link startup by EEPROM parameters (BFM#AH b8) was executed.	Register parameters by executing the request for parameter registration to EEPROM (BFM#AH b10).
BA19	Error in corresponding station	In the line test 2, communication was disabled in the tested station.	Check the cables and the corresponding station.
BA1B	Error in all stations	In the line test 1, communication was disabled in all stations.	Check the cables.
BBC2	Station number setting error (switch)	The station number setting switch in the module is not set inside the range from 0 to 64.	Set a value inside the specification range (0 to 15) of the FX Series master station.
BBC3	Transmission speed setting error (switch)	The transmission speed setting switch in the module is not set inside the range from 0 to 4.	Set a value inside the range from 0 to 4.
BBC5	Master station overlap error	The master station already exists.	Review the station number setting switch.
BBC6	Mode change error	An attempt was made to change the mode from 0 or 2 to test by executing the write request for module reset (BFM#AH b4).	Change the mode by resetting the PLC.
BBC7	Module error	Module is defective.	Replace the module.
BFFE	CPU watchdog timer timeout	The CPU watchdog timer is timed out.	Check the operation of the target station.

13.4 LED Indication Status

This section shows the LED indication status in each station in each data link (system) status. Use this section as reference of troubleshooting.

13.4.1 When data link is normal

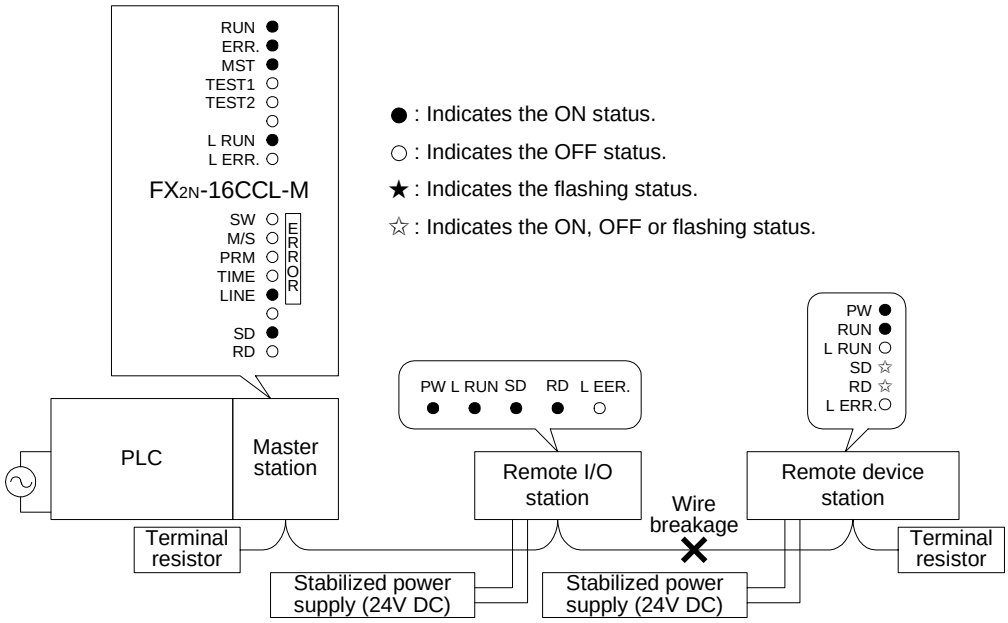
The RUN, MST, L RUN, SD and RD LED indicators are ON.



13.4.2 When a cable is broken

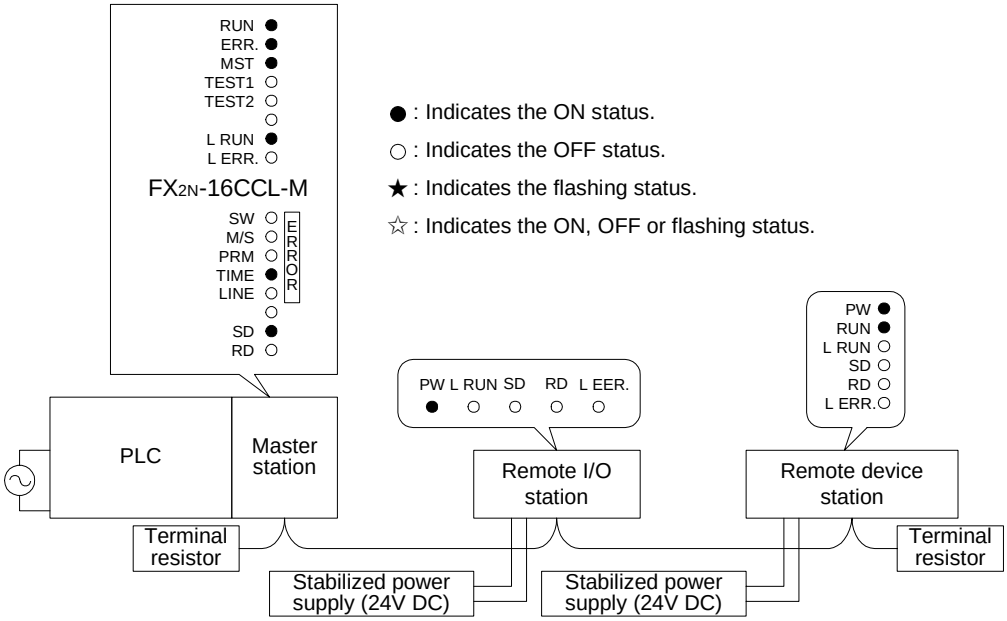
Data link is disabled in all stations.

The L RUN LED indicator is OFF in stations after the breakage position.



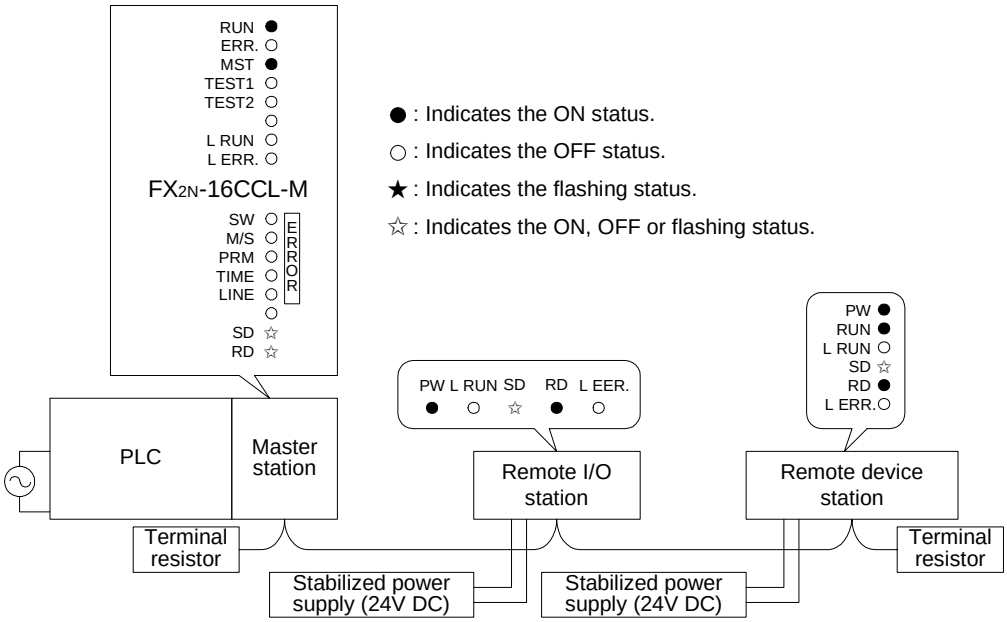
13.4.3 When a cable is short-circuited

Data link is disabled in all stations.
The L RUN LED indicator is OFF in all stations except the master station. However, the short-circuited point cannot be detected from the LED indication.



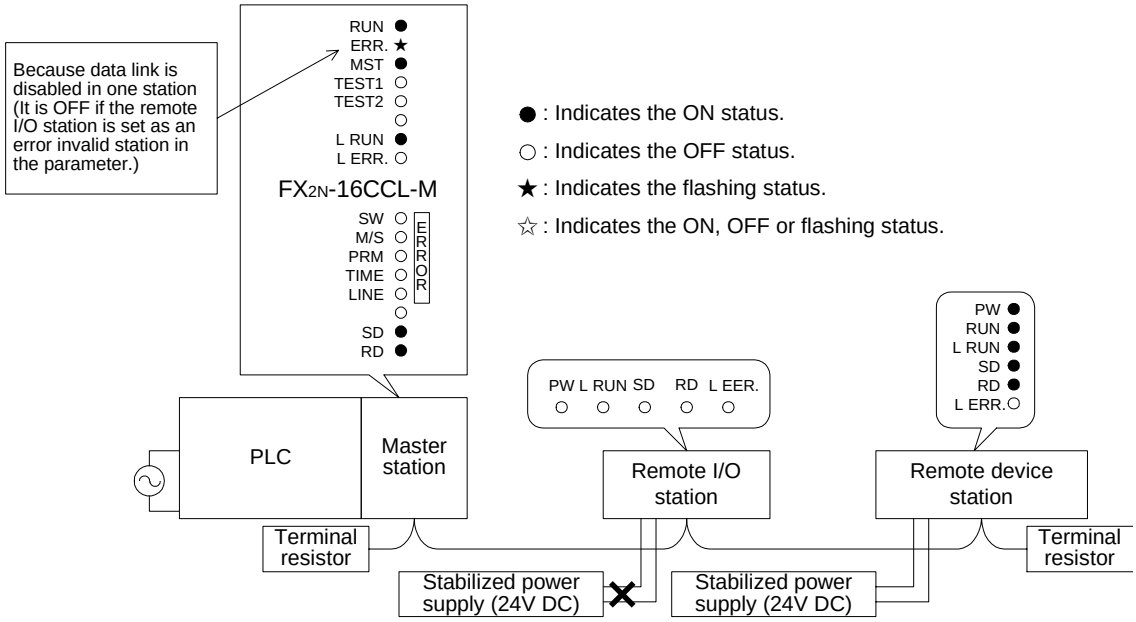
13.4.4 When link is stopped in the master station

Data link is disabled in all stations.
The L RUN LED indicator is OFF in all stations.



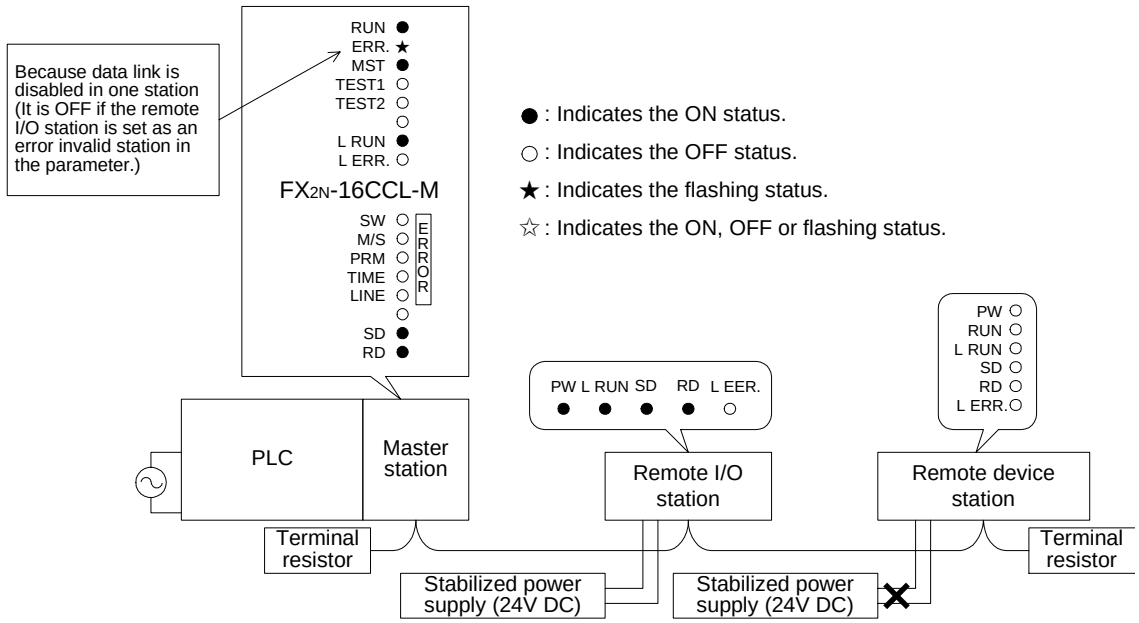
13.4.5 When power supply to a remote I/O station is turned off

Data link continues excluding the remote I/O station.
The ERR LED indicator is flashing in the master station.



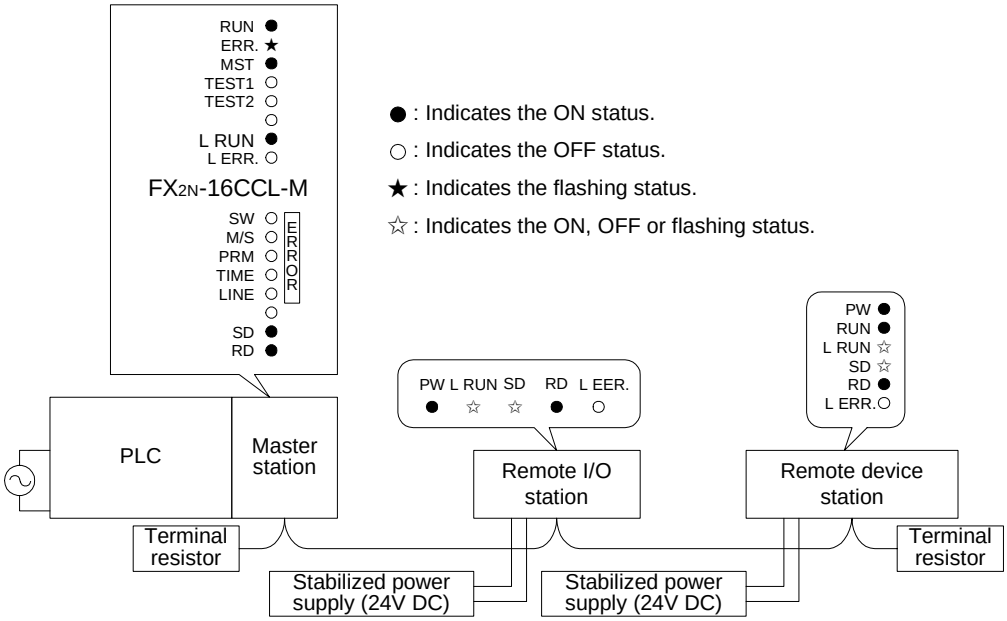
13.4.6 When power supply to a remote device station is turned off

Data link continues excluding the remote device station.
The ERR LED indicator is flashing in the master station.



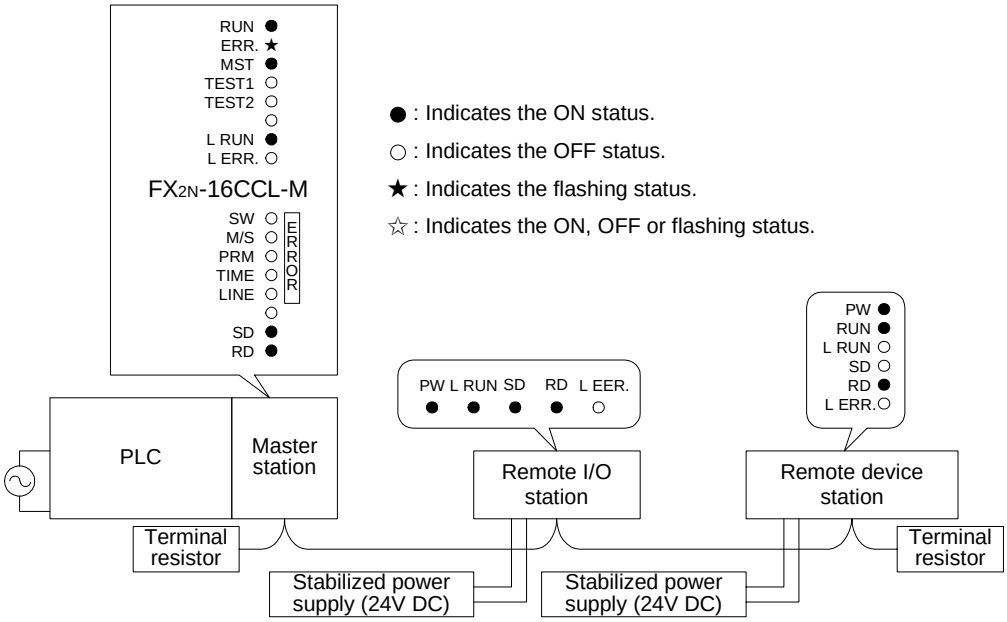
13.4.7 When a station number overlaps

The example below shows a case in which a station number overlaps in a remote I/O station and a remote device station.
Because a skipped number (number without a slave station) is made in the system due to station number overlap, the ERR LED indicator is flashing in the master station.



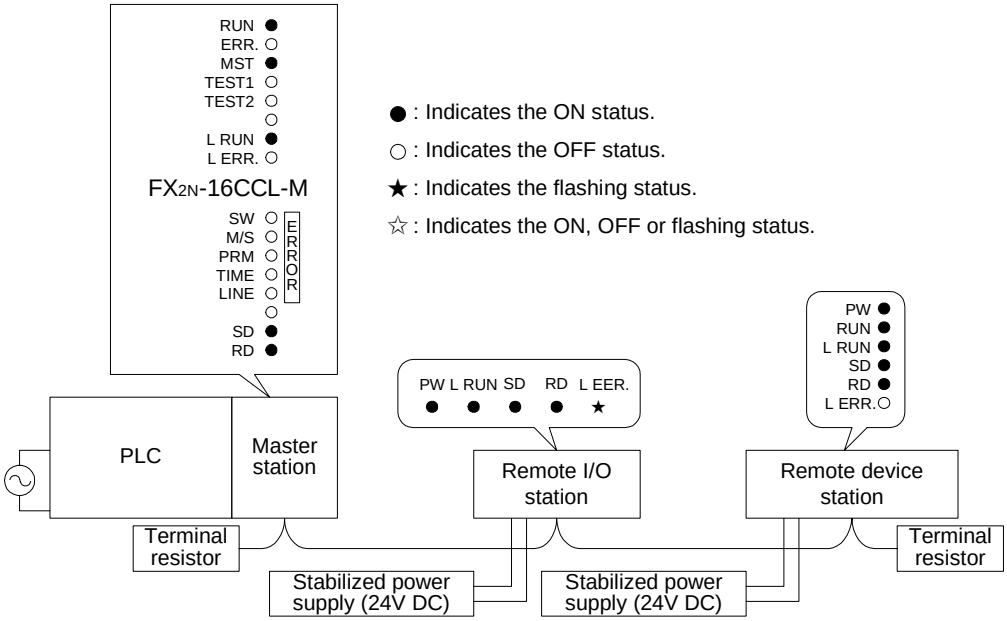
13.4.8 When the transmission speed is incorrectly set

The example below shows a case in which the transmission speed setting is wrong in a remote device station.
The L RUN LED indicator is OFF in a remote device station in which the transmission speed setting is wrong.



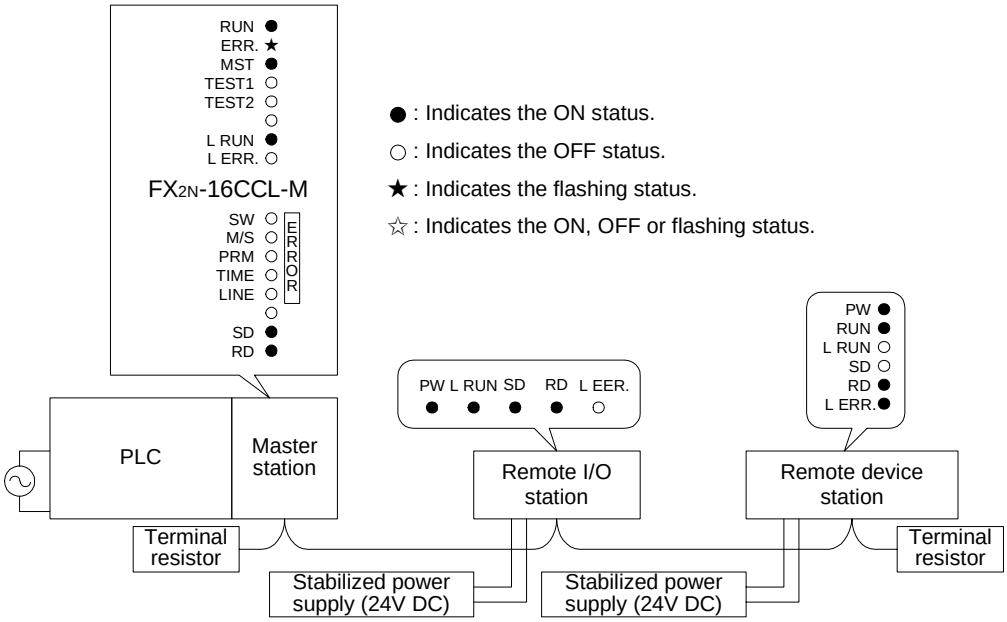
13.4.9 When the switch setting is changed during data link

The example below shows a case in which the switch setting is changed in a remote I/O station.
The L ERR LED indicator is flashing in a remote I/O station in which the switch setting is changed. However, data link can continue.
When the switch setting is returned to the previous status, the L ERR LED indictor turns off.



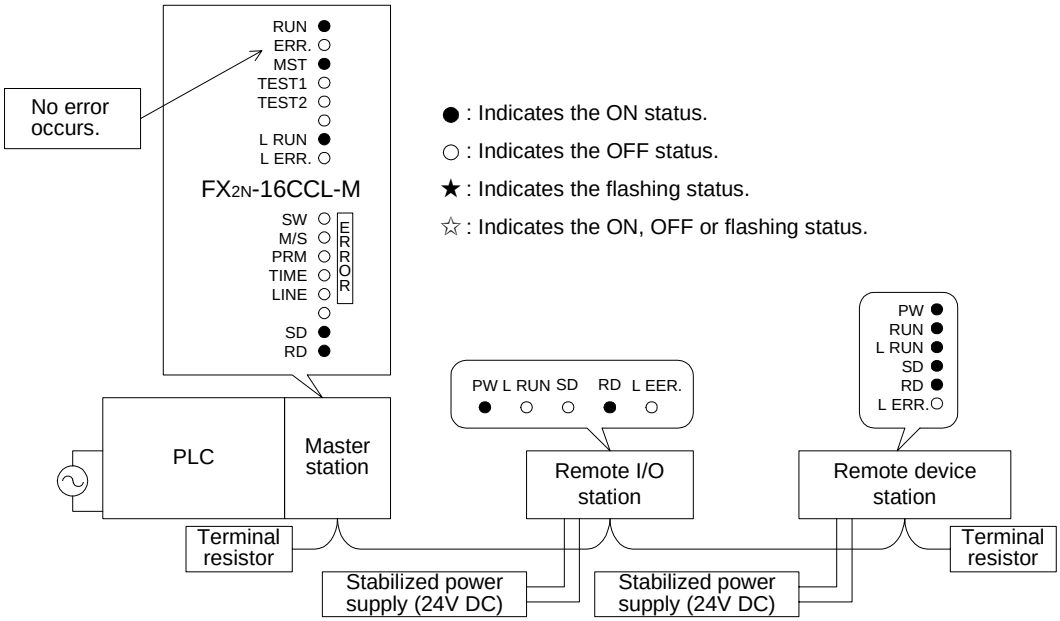
13.4.10 When data link is started with a switch set outside the allowable range

The example below shows a case in which a switch was set outside the allowable range in a remote device station, then data link is started up.
In the remote device station, the L RUN LED indicator is OFF, and the L ERR LED indicator is ON.



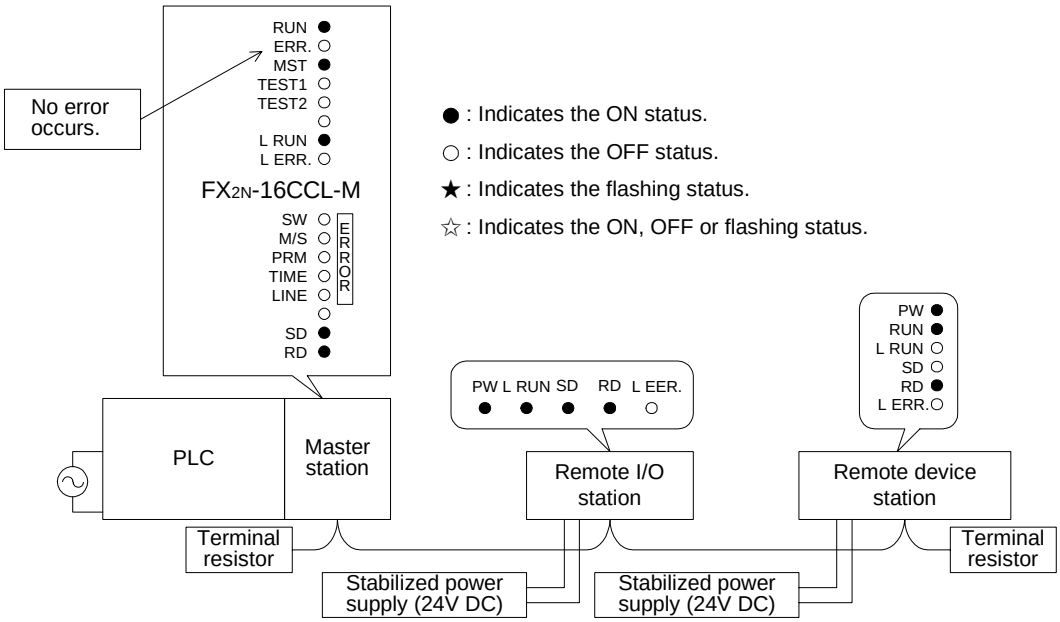
13.4.11 When a remote I/O station is not set in the parameter (and set as a reserved station)

Data link is completely disabled in the remote I/O station, and no error occurs.
The L RUN and SD LED indicators are OFF in the remote I/O station.



13.4.12 When a remote device station is not set in the parameter (and set as a reserved station)

Data link is completely disabled in the remote device station, and no error occurs.
The L RUN and SD LED indicators are OFF in the remote device station.



14. Appendix

Parameter setting sheet

Table 14.1:

Item	Setting range	Buffer memory address	Remarks	Default	Preset value
Number of connected modules	1 to 15	1H	—	8	
Number of retries	1 to 7	2H	—	3	
Number of automatic return modules	1 to 10	3H	—	1	
Operation specification against CPU down	0: Stop, 1: Continue	6H	—	0 (stop)	
Reserved station specification	Set to 1 the bits corresponding to reserved stations.	10H	Station Nos. 15 to 1	0000H	
Invalid station specification	Set to 1 the bits corresponding to invalid stations.	14H	Station Nos. 15 to 1	0000H	
Station information	b15 to b12 (station type) 0: Remote I/O station 1: Remote device station b11 to b8 (number of occupied stations) 1: Occupies 1 station. 2: Occupies 2 stations. 3: Occupies 3 stations. 4: Occupies 4 stations. b7 to b0 (station number) 01H to 1EH (1 to 15)	20H	1st module	0101H	
		21H	2nd module	0102H	
		22H	3rd module	0103H	
		23H	4th module	0104H	
		24H	5th module	0105H	
		25H	6th module	0106H	
		26H	7th module	0107H	
		27H	8th module	0108H	
		28H	9th module	0109H	
		29H	10th module	010AH	
		2AH	11th module	010BH	
		2BH	12th module	010CH	
		2CH	13th module	010DH	
		2DH	14th module	010EH	
		2EH	15th module	010FH	

Station information setting sheet

Table 14.2:

Station number	Station type	Number of occupied stations	Reserved station/invalid station specification
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

Device assignment sheet (remote I/O)

Table 14.3:

Station number	Remote input (RX)	Remote output (RY)
1	RX00 to RX1F →	RY00 to RY1F →
2	RX20 to RX3F →	RY20 to RY3F →
3	RX40 to RX5F →	RY40 to RY5F →
4	RX60 to RX7F →	RY60 to RY7F →
5	RX80 to RX9F →	RY80 to RY9F →
6	RXA0 to RXBF →	RYA0 to RYBF →
7	RXC0 to RXDF →	RYC0 to RYDF →
8	RXE0 to RXFF →	RYE0 to RYFF →
9	RX100 to RX11F →	RY100 to RY11F →
10	RX120 to RX13F →	RY120 to RY13F →
11	RX140 to RX15F →	RY140 to RY15F →
12	RX160 to RX17F →	RY160 to RY17F →
13	RX180 to RX19F →	RY180 to RY19F →
14	RX1A0 to RX1BF →	RY1A0 to RY1BF →
15	RX1C0 to RX1DF →	RY1C0 to RY1DF →

Device assignment sheet (remote register)

Table 14.4:

Station number	Write (RWw)	Read (RWr)
1	RWw0 to RWw3 →	RWr0 to RWr3 →
2	RWw4 to RWw7 →	RWr4 to RWr7 →
3	RWw8 to RWwB →	RWr8 to RWrB →
4	RWwC to RWwF →	RWrC to RWrF →
5	RWw10 to RWw13 →	RWr10 to RWr13 →
6	RWw14 to RWw17 →	RWr14 to RWr17 →
7	RWw18 to RWw1B →	RWr18 to RWr1B →
8	RWw1C to RWw1F →	RWr1C to RWr1F →
9	RWw20 to RWw23 →	RWr20 to RWr23 →
10	RWw24 to RWw27 →	RWr24 to RWr27 →
11	RWw28 to RWw2B →	RWr28 to RWr2B →
12	RWw2C to RWw2F →	RWr2C to RWr2F →
13	RWw30 to RWw33 →	RWr30 to RWr33 →
14	RWw34 to RWw37 →	RWr34 to RWr37 →
15	RWw38 to RWw3B →	RWr38 to RWr3B →

MEMO

Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation, use and/or programming of the products associated with this manual.
All examples and diagrams shown in this manual are intended as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.
Owing to the very great variety of possible applications, users must satisfy themselves as to the suitability of each specific application.

USER'S MANUAL

FX2N-16CCL-M CC-Link SYSTEM MASTER BLOCK

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE: MITSUBISHI DENKI BLDG MARUNOUCHI TOKYO 100-8310 TELEX: J24532 CABLE MELCO TOKYO
HIMEJI WORKS: 840, CHIYODA CHO, HIMEJI, JAPAN

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Specification are subject
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